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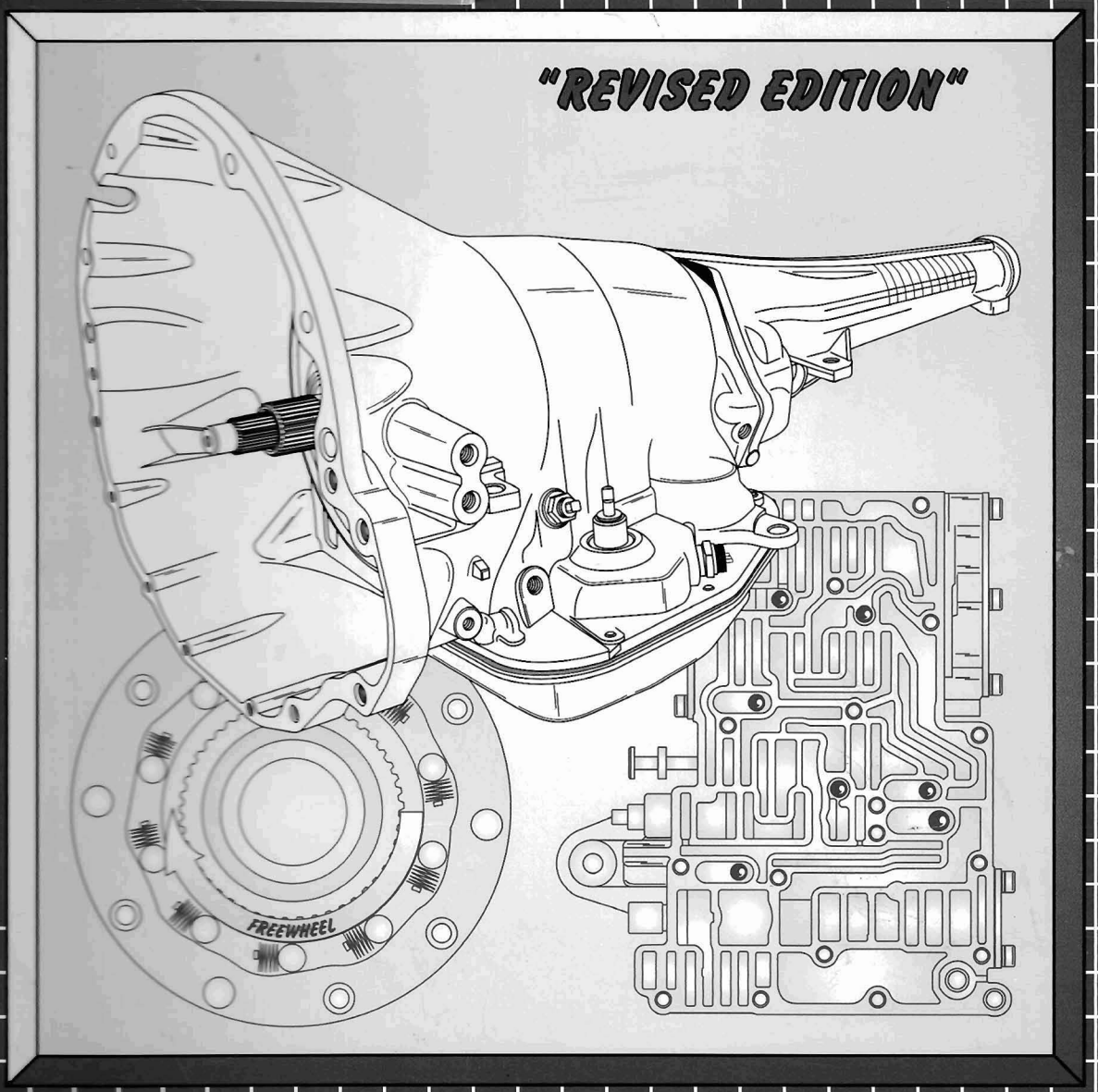
# CHRYSLER PASSENGER CARS
## TECHTRAN™ MANUAL

TEC 727/904
PARTS DIVISION
Transmission Exchange Co.

A727 | A904

"REVISED EDITION"

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AUTOMATIC TRANSMISSION SERVICE GROUP

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# TORQUEFLIGHT
# A-727 A-904

*We thank the Chrysler Corporation for the illustrations that have made this booklet possible. This booklet contains the general description of the lock-up converter. A special tool section is included. The teardown and assembly is fully covered. In car service procedures are outlined.*


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AUTOMATIC TRANSMISSION SERVICE GROUP

# TORQUEFLITE A-727 A-904

## GENERAL INFORMATION

**Safety goggles should be worn at all times when working on transmissions.**

The identification features and usage of the Load-Flite Transmissions is covered in Diagnosis and Tests.

Because of the similarity in design and in servicing the transmissions, the procedures have been combined in this manual. Where variations in procedures occur, application is indicated. Figure 1, 2 or 3.

**Transmission operation requirements are different for each vehicle and engine combination and some internal parts will be different to provide for this. Therefore, when replacing parts, refer to the seven digit part number stamped on left side of the transmission oil pan flange.**

**All A-904T and A-999 transmissions are equipped with a wide-ratio gear set. Low gear ratio is 2.74 to 1. The sun gear and front planetary gear set is unique to the wide-ratio transmission. The rear planetary gear set remains the same as previous models.**

The transmission combines a torque converter and a fully-automatic 3-speed gear system. The torque converter housing and transmission case are an integral aluminum casting. The transmission consists of 2 multiple-disc clutches, an overrunning clutch, 2 servos and bands, and 2 planetary gear sets to provide three forward ratios and a reverse ratio. The common sun gear of the planetary gear sets is connected to the front clutch by a driving shell which is splined to the sun gear and engages the front clutch retainer. The hydraulic system consists of an oil pump, and a single valve body assembly which contains all of the valves except the governor valve.

Venting of the transmission is accomplished by a passage through the upper part of the oil pump housing.

The torque converter is attached to the crankshaft through a flexible driving plate. Cooling of the torque converter is accomplished by circulating the transmission fluid through an oil-to-water type cooler, located in the radiator lower tank. The torque converter assembly is a sealed unit which cannot be disassembled. A lock-up clutch is located inside most torque converters.

The transmission fluid is filtered by an internal "Dacron Type" filter attached to the lower side of the valve body assembly.

Engine torque is transmitted to the torque converter, then, through the input shaft to the multiple-disc clutches in the transmission. The power flow depends on the application of the clutches and bands. Refer to "Elements in Use Chart" in Diagnosis and Tests section.

### *Lock-up Torque Converter*

The A-904T (except California models) and A-999 transmissions are both equipped with **lock-up** torque converters. The A-727 transmission is **non lockup.**

The lock-up mode is activated only in direct drive and is controlled by the engine electronics. A lock-up solenoid on the valve body transfer plate, is powered by the engine ESA module to activate torque converter lock-up.

Lock-up and non lock-up torque converters and transmissions are **not** intermixable.

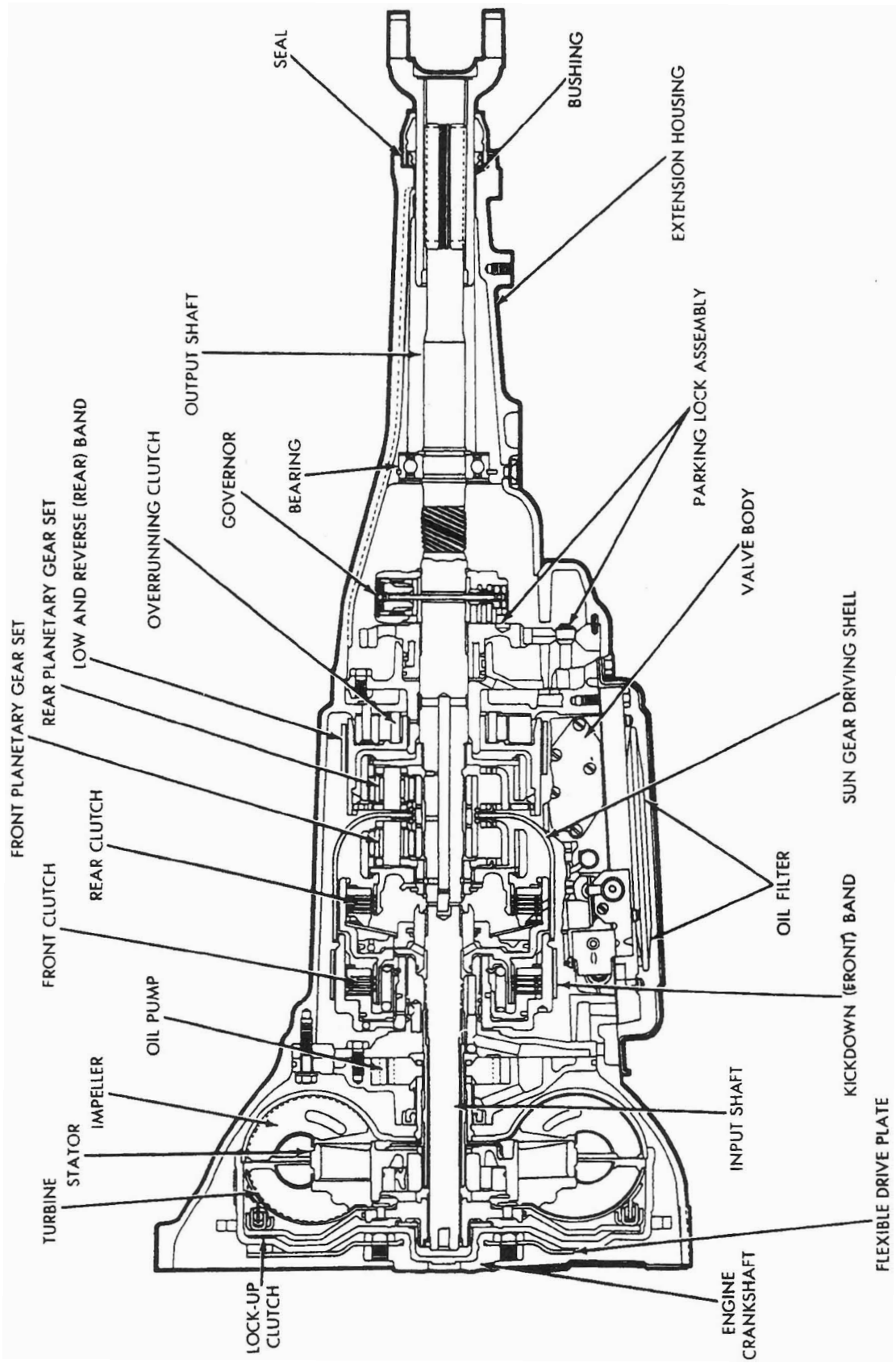
## HYDRAULIC CONTROL SYSTEM

The hydraulic control circuits diagrams show the position of the various valves with color coded passages to indicate those under hydraulic pressure for all operations of the transmission.

The hydraulic control system makes the transmission fully automatic, and has four important functions to perform. In a general way, the components of any automatic transmission control system may be grouped into the following basic groups:

The pressure supply system, the pressure regulating valves, the flow control valves, the clutches, and band servos.

Taking each of these basic groups or systems in turn, the control system may be described as follows:


SEAL
BUSHING
EXTENSION HOUSING
OUTPUT SHAFT
PARKING LOCK ASSEMBLY
GOVERNOR
BEARING
VALVE BODY
OVERRUNNING CLUTCH
LOW AND REVERSE (REAR) BAND
REAR PLANETARY GEAR SET
FRONT PLANETARY GEAR SET
SUN GEAR DRIVING SHELL
REAR CLUTCH
OIL FILTER
FRONT CLUTCH
KICKDOWN (FRONT) BAND
OIL PUMP
IMPELLER
INPUT SHAFT
STATOR
TURBINE
FLEXIBLE DRIVE PLATE
LOCK-UP CLUTCH
ENGINE CRANKSHAFT

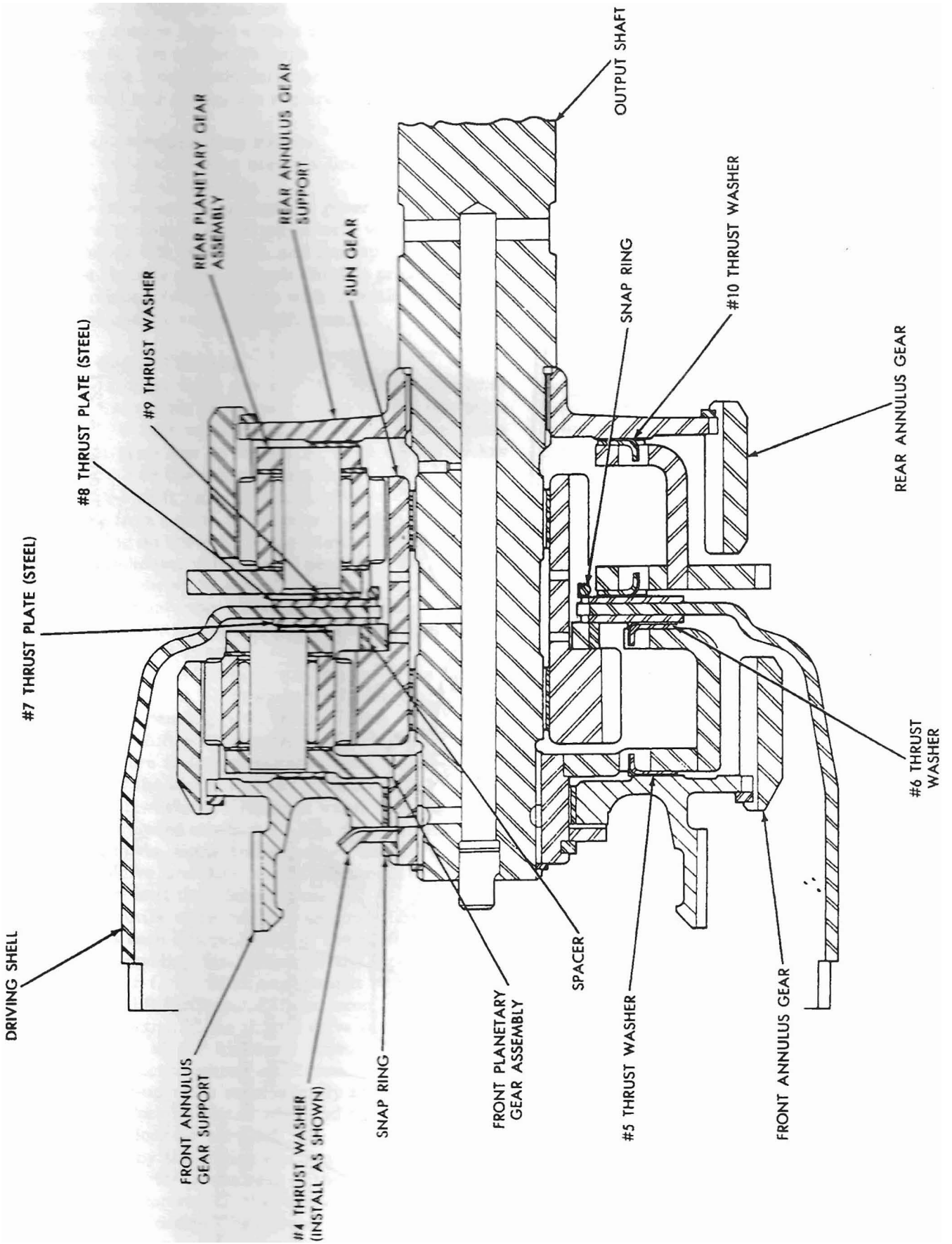



*Fig. 2—Wide-Ratio Planetary Gears Assembly (A-904T and A-999)*

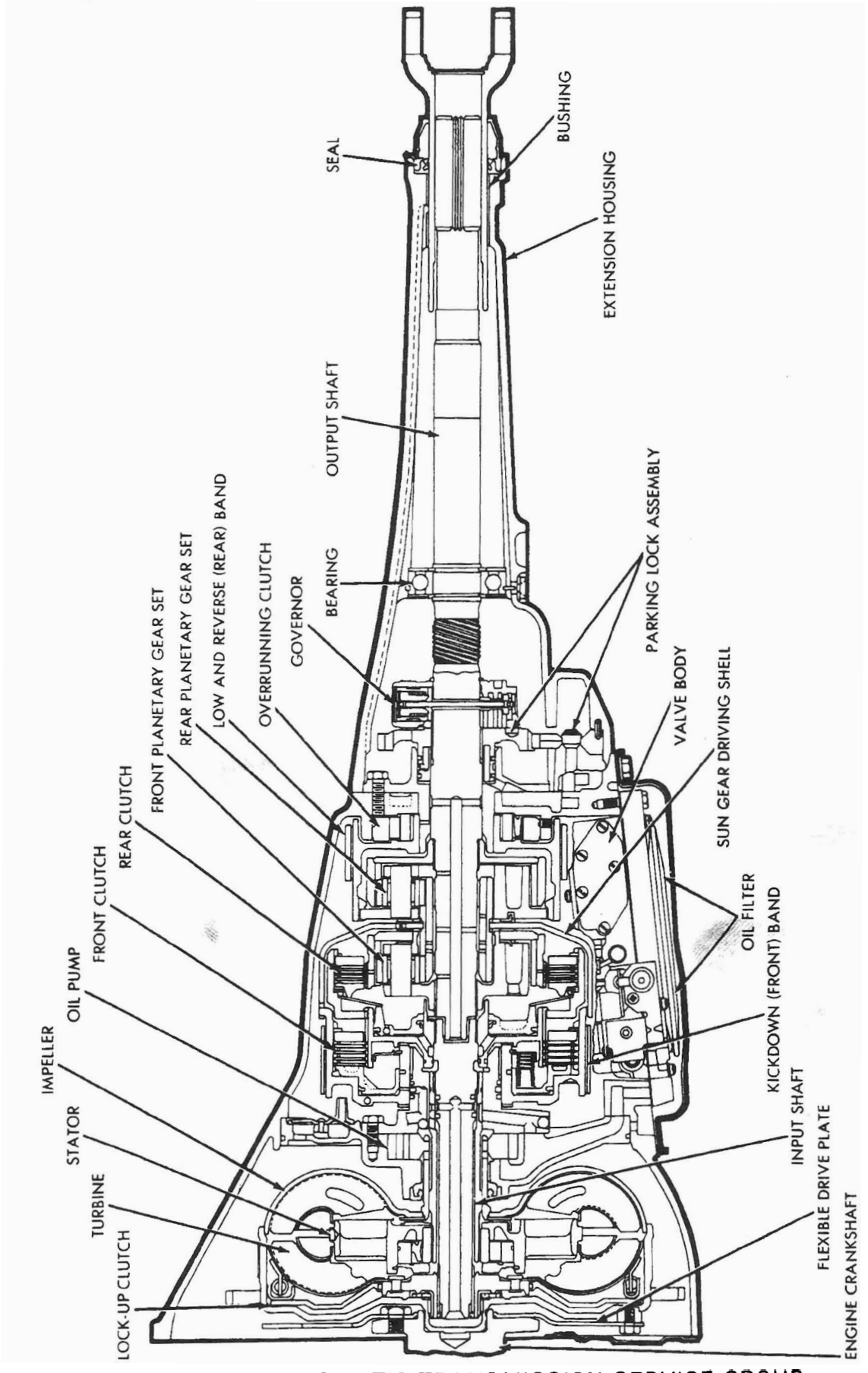



*Fig. 3—LoadFlite Transmission and Torque Converter (A-727)*

### Pressure Supply System

The pressure supply system consists of an oil pump driven by the engine through the torque converter. The single front pump furnishes pressure for all the hydraulic and lubrication requirements.

### Pressure Regulating Valves

The regulator valve controls line pressure dependent on throttle opening.

The governor valve controls governor pressure to the transmission (which varies with vehicle speed) to control upshift, downshift, and lock-up speeds.

The throttle valve controls throttle pressure to the transmission (which varies with throttle position) to control upshift and downshift speeds.

### Flow Control Valves

The manual valve provides the different transmission drive ranges as selected by the vehicle operator.

The 1-2 shift valve automatically shifts the transmission from low to second or from second to low depending on the vehicle operation.

The 2-3 shift valve automatically shifts the transmission from second to direct or from direct to second depending on the vehicle operation.

The kickdown valve makes possible a forced downshift from direct to second, second to breakaway, or direct to breakaway (depending on vehicle speed) by depressing the accelerator pedal past the detent "feel" near wide open throttle.

The throttle pressure plug at the end of the 2-3 shift valve, provides a 3-2 downshift with varying throttle openings depending upon vehicle speed.

The 1-2 shift control valve transmits 1-2 shift control pressure to the transmission accumulator piston to control the kickdown band capacity on 1-2 upshifts and 3-2 downshifts. The limit valve determines the maximum speed at which a 3-2 part throttle kickdown can be made. Some transmissions **do not** have the Limit Valve and the maximum speed for the 3-2 kickdown is at the "detent" position.

The shuttle valve has two separate functions and performs each independently of the other. The first is that of providing fast release of the kickdown band, and smooth front clutch engagement when the driver makes a "lift-foot" upshift from second to direct. The second function of the shuttle valve is to regulate the application of the kickdown servo and band when making direct to second kickdowns.

The lock-up valve automatically applies the torque converter lock-up clutch when fed with line pressure from the lock-up solenoid. The lock-up solenoid is controlled by the engine electronics through an electrical connector in the rear of the transmission case. Electronic control of the torque converter lock-up includes unlocking the torque converter at closed throttle, during engine warm-up, and during part-throttle acceleration. The nonlock-up A-904T, used in California, has a threaded plug in the rear of the transmission case in place of the lock-up wiring connector.

The fail-safe valve restricts feed to the lock-up clutch if front clutch pressure drops. It permits lock-up only in direct gear and provides a fast lock-up release during a kickdown.

The switch valve directs oil to apply the lock-up clutch in one position and releases it in the other as well as directs oil to the cooling and lube circuits. The switch valve also regulates the oil pressure to the torque converter and limits the maximum oil pressure to 130 psi.

### Clutches, Band Servos, and Accumulator

The front and rear clutch pistons, and both servo pistons are moved hydraulically to engage the clutches and apply the bands. The pistons are released by spring tension when hydraulic pressure is released. On the 2-3 upshift, the kickdown servo piston is released by spring tension and hydraulic pressure and the lock-up piston is applied by hydraulic pressure within the torque converter.

The accumulator controls the hydraulic pressure on the apply side of the kickdown servo during the 1-2 shift; thereby, cushioning the kickdown band application at any throttle position.

## OPERATING INSTRUCTIONS

The transmission will automatically upshift and downshift at approximately the speeds shown in the "Automatic Shift Speed Chart." All shift speeds given in the "Chart" may vary somewhat due to production tolerances and rear axle ratios. The quality of the shifts is very important. All shifts should be smooth and positive with no noticeable engine runaway. See "Diagnosis and Tests" for chart.

### Gearshift and Parking Lock Controls

The transmission is controlled by a "lever type" gearshift incorporated within the steering column. The control has six selector lever positions: P (park), R (reverse), N (neutral), D (drive), 2 (second), and 1 (first). The parking lock is applied by moving the selector lever past a gate to the P (park) position. **Do not apply the parking lock until the vehicle has stopped; otherwise, a severe ratcheting noise will occur.**

### Starting the Engine

The engine will start with the selector lever in either the P (park) or N (neutral) positions. As a safety precaution when starting in the N (neutral) position, apply the parking or foot brake. The LoadFlite transmission will not permit starting the engine by pushing or towing.

ing the cooler tubes and placing the rear cooler tube into a 1 quart container. Overfill the transmission by 1 quart. Watching a clock, start engine (run at curb idle) and run in neutral for exactly 20 seconds. If cooler flow is less than 1 quart in 20 seconds, replace the radiator or have the radiator bottom cooler professionally reconditioned.

***Manual Linkage***

Normal operation of the neutral safety switch provides a quick check to confirm proper manual linkage adjustment.

Move the selector lever slowly upward until it clicks into the "P" Park notch in the selector gate. If the starter will operate the "P" position is correct.

After checking "P" position move the selector slowly toward "N" Neutral position until the lever drops at the end of the "N" stop in the selector gate. If the starter will also operate at this point the manual linkage is properly adjusted. If adjustment is required, refer to "Gearshift Linkage Adjustment" in "Maintenance and Adjustments".

***Throttle Linkage***

The throttle rod adjustment is very important to proper transmission operation. This adjustment positions a valve which controls shift speed, shift quality and part throttle downshift sensitivity. If the setting is too short, early shifts and slippage between shifts may occur. If the setting is too long, shifts may be delayed and part throttle downshifts may be very sensitive. Refer to "Throttle Rod Adjustment" in "Maintenance and Adjustments".

***Road Test***

Prior to performing a road test, be certain that the fluid level and condition, and control linkage adjustments have been checked and approved.

During the road test the transmission should be operated in each position to check for slipping and any variation in shifting. Note whether the shifts are harsh or spongy and check the speeds where the upshifts and downshifts occur. Approximate shift speeds for the various modes of operation are shown in the "Automatic Shift Speeds and Governor Pressure" chart.

Observe closely for slipping or engine speed flare-up. Slipping or flare-up in any gear usually indicates clutch, band, or overrunning clutch problems. If the condition is far advanced, an overhaul will probably be necessary to restore normal operation.

In most cases, the clutch or band that is slipping can be determined by noting the transmission operation in all selector positions and by comparing which internal units are applied in those positions. The "Elements in Use Chart" provides a basis for road test analysis.

By observing that the rear clutch is applied in both the "D" first gear and "1" first gear positions, but that the overrunning clutch is applied in "D" first and the low and reverse band is applied in "1" first, if the transmission slips in "D" range first gear but does not slip in "1" first gear, the overrunning clutch must be the unit that is slipping. Similarly, if the transmission slips in any two forward gears, the rear clutch is the slipping unit.

Using the same procedure, the rear clutch and front clutch are applied in "D" third gear. If the transmission slips in third gear, either the front clutch or the rear clutch is slipping. By selecting another gear which does not use one of those units, the unit which is slipping can be determined. If the transmission also slips in reverse, the front clutch is slipping. If the transmission does not slip in reverse, the rear clutch is slipping.

This process of elimination can be used to detect any unit which slips and to confirm proper operation of good units. However, although road test analysis can usually diagnose slipping units, the actual cause of the malfunction usually cannot be decided. Practically any condition can be caused by leaking hydraulic circuits or sticking valves.

**Therefore, unless the condition is obvious, like no drive in "D" range first gear only, the transmission should never be disassembled until hydraulic pressure tests have been performed.**

An engine tachometer can be used to determine if the lock-up clutch, in the torque converter, is functioning. An instantaneous rise in engine speed of more than 150 rpm at 60 mph (97 km/h) when the throttle is opened just short of kickdown, indicates that the lock-up clutch is slipping more than normal.

## HYDRAULIC PRESSURE TESTS

Pressure testing is a very important step in the diagnostic procedure. These tests usually reveal the cause of most transmission problems.

Before performing pressure tests, be certain that fluid level and condition, and control linkage adjustments have been checked and approved. Fluid must be at operating temperature (150 to 200 degrees F.).

Install an engine tachometer, raise vehicle on hoist which allows rear wheels to turn, and position the tachometer so it can be read under the vehicle.

Disconnect throttle rod and shift rod from transmission levers so they can be controlled under the vehicle.

Attach 100 psi gauges (C-3292) to ports required for test being conducted. A 300 psi gauge (C-3293) is required for "reverse" pressure test at rear servo.

Test port locations are shown in (Figs. 1 and 2).

***Mountain Driving***

When driving in the mountains with either heavy loads or when pulling trailers, the 2 (second) or 1 (low) position should be selected on upgrades which require heavy throttle for 1/2 mile or more. This reduces possibility of overheating the transmission and torque converter under these conditions.

***Towing Vehicle***

**Transmission Inoperative:** Tow the vehicle with a rear end pickup or remove the propeller shaft.

**Transmission Operating Properly:** The vehicle may be towed safely in N (neutral) with rear wheels on the ground at a speed not to exceed 30 mph (48 km/h). **If the vehicle is to be towed for extended distances, it should be done with a rear end pickup or the propeller shaft removed.** Because the transmission receives lubrication only when the engine is running, **it is good practice to always tow a disabled vehicle with a rear end pickup** or remove the propeller shaft.

# DIAGNOSIS AND TESTS

## DIAGNOSIS—GENERAL

Automatic transmission malfunctions may be caused by four general conditions: poor engine performance, improper adjustments, hydraulic malfunctions, and mechanical malfunctions. Diagnosis of these problems should always begin by checking the easily accessible variables: fluid level and condition, manual linkage adjustment, and throttle linkage adjustment. Then perform a road test to determine whether the problem has been corrected or that more diagnosis is necessary. **If the problem exists after the preliminary tests and corrections are completed, hydraulic pressure tests should be performed.**

***Fluid Level and Condition***

If a failure of any kind has contaminated the transmission fluid, the oil cooler and cooler tubes must be reverse flushed (see "Oil Cooler and Cooler Tubes Flushing.")

Before removing the dipstick, wipe all dirt off of the protective cap and top of the filler tube.

Since the torque converter fills more slowly in the "P" Park position, place the selector lever in "N" Neutral to be sure that the fluid level check is accurate. **The vehicle must be on level ground.** The engine should be running at idle speed. The fluid should be at normal operating temperature (approximately 175° F). The fluid level is correct if it is between the "Full" and "Add" marks on the dipstick.

Low fluid level can cause a variety of conditions because it allows the pump to take in air along with the fluid. As in any hydraulic system, air bubbles make the fluid spongy, therefore, pressures will be low and build up slowly.

Improper filling can also raise the fluid level too high. When the transmission has too much fluid, the gears churn up foam and cause the same conditions which occur with a low fluid level.

In either case, the air bubbles can cause overheating, fluid oxidation, and varnishing, which can interfere with normal valve, clutch, and servo operation. Foaming can also result in fluid escaping from the transmission vent where it may be mistaken for a leak.

Along with fluid level, it is important to check the condition of the fluid. When the fluid smells burned, and is contaminated with metal or friction material particles, a complete transmission overhaul is needed and because the torque converter cannot be flushed, it should be replaced. Be sure to examine the fluid on the dipstick closely. If there is any doubt about its condition, drain out a sample for a double check.

After the fluid has been checked, seat the dipstick fully to seal out water and dirt.

## OIL COOLERS AND TUBES FLUSHING

When a transmission or lock-up clutch failure has contaminated the fluid, the oil cooler(s) should be reverse flushed to insure that metal particles or sludged oil are not later transferred back into the reconditioned transmission.

(1) Disconnect both cooler lines at radiator.

(2) Dislodge any foreign material at the inlet side of the cooler with a small screwdriver.

(3) Reverse flush the cooler with a combination of mineral spirits and pulsating air under pressure (shop air).

(4) Treat the cooler lines separately and insure they are clear by flowing mineral spirits or automatic transmission fluid through them.

(5) Remove leftover mineral spirits from cooler and cooler lines by flowing automatic transmission fluid through them.

(6) Cooler flow should now be checked by connect-

## ELEMENTS IN USE AT EACH POSITION OF THE SELECTOR LEVER

| Lever Position | Standard Ratio | Wide Ratio | Start Safety | Parking Sprag | Clutches Front | Clutches Rear | Clutches Over-running | Clutches Lock-up | Bands (Kickdown) Front | Bands (Low-Reverse) Rear |
|---|---|---|---|---|---|---|---|---|---|---|
| P—PARK | | | X | X | | | | | | |
| R—REVERSE | 2.21 | 2.21 | | | X | | | | | X |
| N—NEUTRAL | | | X | | | | | | | |
| D—DRIVE | | | | | | | | | | |
| First | 2.45 | 2.74 | | | | X | X | | | |
| Second | 1.45 | 1.54 | | | | X | | | X | |
| Direct | 1.00 | 1.00 | | | X | X | | X | | |
| 2—SECOND | | | | | | | | | | |
| First | 2.45 | 2.74 | | | | X | X | | | |
| Second | 1.45 | 1.54 | | | | X | | | X | |
| 1—LOW (First) | 2.45 | 2.74 | | | | X | | | | X |

### *Test One (Selector in "1")*

(1) Attach gauges to "line" and "rear servo" ports.

(2) Operate engine at 1000 rpm for tests.

(3) Move selector lever on transmission all the way forward ("1" position).

(4) Read pressures on both gauges as throttle lever on transmission is moved from full forward position to full rearward position.

(5) Line pressure should read 54 to 60 psi (372 to 414 kPa) with throttle lever forward and gradually increase, as lever is moved rearward, to 90 to 96 psi (621 to 662 kPa).

(6) Rear servo pressure should read the same as line pressure within 3 psi.

(7) This tests pump output, pressure regulation, and condition of rear clutch and rear servo hydraulic circuits.

### *Test Two (Selector in "2")*

(1) Attach gauge to "line pressure" port and "tee" into rear cooler line fitting to read "lubrication" pressure.

(2) Operate engine at 1000 rpm for test.

(3) Move the selector lever on transmission to "detent" rearward from full forward position. This is selector "2" position.

(4) Read pressures on both gauges as throttle lever on transmission is moved from full forward position to full rearward position.

(5) Line pressure should read 54 to 60 psi (372 to 414 kPa) with throttle lever forward and gradually increase, as lever is moved rearward, to 90 to 96 psi (621 to 662 kPa).

(6) Lubrication pressure should be 5 to 15 psi (34 to 103 kPa) with lever forward and 10 to 30 psi (68 to 207 kPa) with lever rearward.

(7) This tests pump output, pressure regulation, condition of rear clutch and lubrication hydraulic circuits.

### *Test Three (Selector in "D")*

(1) Attach gauges to "line" and "front servo release" ports.

(2) Operate engine at 1600 rpm for test.

(3) Move the selector lever on transmission two "detents" rearward from full forward position. This is selector "D" position.

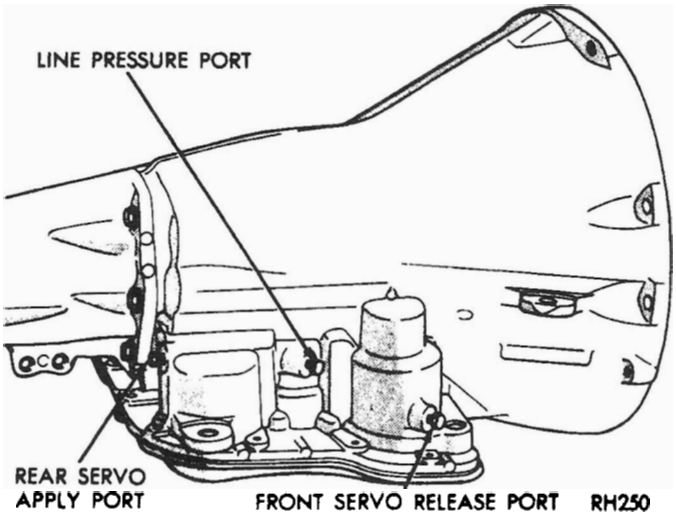



*Fig. 1—Pressure Test Locations*

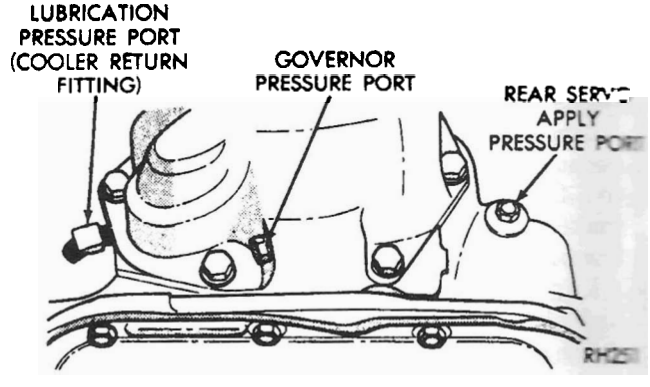



*Fig. 2—Pressure Test Locations*

(4) Read pressures on both gauges as throttle lever on transmission is moved from full forward position to full rearward position.

(5) Line pressure should read 54 to 60 psi (372 to 414 kPa) with throttle lever forward and gradually increase, as lever is moved rearward.

(6) Front servo release is pressurized only in direct drive and should be same as line pressure within 3 psi (21 kPa), up to downshift point.

(7) This tests pump output, pressure regulation, and condition of rear clutch, front clutch, and lock-up clutch hydraulic circuits.

***Test Four (Selector in Reverse)***

(1) Attach 300 psi gauge to "rear servo apply" port.

(2) Operate engine at 1600 rpm for test.

(3) Move the selector lever on transmission four "detents" rearward from full forward position. This is selector "R" position.

(4) Rear servo pressure should read 145 to 175 psi with throttle lever forward and increase gradually to 230-280 psi as throttle lever is moved rearward.

(5) This tests pump output, pressure regulation, and condition of front clutch and rear servo hydraulic circuits.

(6) Move selector lever on transmission to "D" position to check that rear servo pressure drops to zero.

(7) This tests for leakage into rear servo, due to case porosity, which can cause reverse band burn out.

***Test Result Indications***

(1) If proper line pressure, minimum to maximum, is found in any one test, the pump and pressure regulator are working properly.

(2) Low pressure in "D, 1 and 2" but correct pressure in "R" indicates rear clutch circuit leakage.

(3) Low pressure in "D and R" but correct pressure in "1" indicates front clutch circuit leakage.

(4) Low pressure in "R and 1" but correct pressure in "2" indicates rear servo circuit leakage.

(5) Low line pressure in all positions indicates a defective pump, a clogged transmission oil filter, or a stuck pressure regulator valve.

***Governor Pressure***

Test only if transmission shifts at wrong vehicle speeds when throttle rod is correctly adjusted.

(1) Connect a 0-100 psi pressure gauge, to governor

## AUTOMATIC SHIFT SPEEDS AND GOVERNOR PRESSURE CHART

### (APPROXIMATE MILES PER HOUR AT ROAD LOAD)
### (km/h = kilometers per hour)

| Engine (C.I.D.) | 225 | | | | 318/360 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Model ..... | 150 | | 250 | | 150 | | 150 | | 250 | | 350 | |
| Axle Ratio ..... | 3.21 | | 3.54 | | 2.71 | | 2.94 | | 3.21 | | 3.54 | |
| Tire Size ..... | P195/75R15 | | P235/75R15XL | | P195/75R15 | | P195/75R15 | | P235/75R15XL | | 8.75x16.5-E | |
| Throttle Closed | mph | km/h | mph | km/h | mph | km/h | mph | km/h | mph | km/h | mph | km/h |
| 1-2 Upshift .... | 8-10 | 13-16 | 8-10 | 13-16 | 10-12 | 16-19 | 9-11 | 14-19 | 9-11 | 14-19 | 8-11 | 13-18 |
| 2-3 Upshift .... | 11-14 | 18-23 | 11-14 | 18-23 | 13-17 | 21-27 | 12-15 | 19-24 | 12-16 | 19-26 | 12-16 | 19-26 |
| 3-1 Downshift . | 8-10 | 13-16 | 8-10 | 13-16 | 10-12 | 16-19 | 9-11 | 14-19 | 9-11 | 14-19 | 8-11 | 13-18 |
| Throttle Wide Open | | | | | | | | | | | | |
| 1-2 Upshift .... | 29-36 | 46-57 | 29-36 | 46-57 | 34-42 | 55-68 | 31-39 | 50-63 | 36-43 | 58-69 | 34-41 | 55-66 |
| 2-3 Upshift .... | 55-61 | 89-98 | 55-61 | 89-98 | 65-73 | 105-118 | 60-67 | 97-108 | 63-70 | 101-113 | 60-67 | 97-108 |
| Kickdown Range | | | | | | | | | | | | |
| 3-2 Downshift | 50-57 | 80-92 | 50-57 | 80-92 | 60-68 | 97-109 | 55-63 | 89-101 | 58-65 | 93-101 | 55-62 | 89-100 |
| 3-1 Downshift | 25-27 | 40-43 | 25-27 | 40-43 | 30-32 | 48-52 | 28-30 | 45-48 | 27-35 | 43-56 | 26-33 | 42-53 |
| Governor Pressure* | | | | | | | | | | | | |
| 15 psi ..... | 16-18 | 26-29 | 16-18 | 26-29 | 19-21 | 31-34 | 17-19 | 27-31 | 17-20 | 27-32 | 16-19 | 26-31 |
| 50 psi ..... | 36-41 | 58-66 | 36-41 | 58-66 | 43-49 | 69-79 | 40-45 | 64-72 | 43-49 | 69-79 | 41-47 | 66-76 |
| 75 psi ..... | 54-59 | 87-95 | 54-59 | 87-95 | 64-70 | 103-113 | 59-65 | 95-105 | 62-68 | 100-110 | 59-65 | 95-105 |

*Governor pressure should be from zero to 1.5 psi at standstill or downshift may not occur.
NOTE: Figures given are typical for the axle ratio and tire size combination. Changes in tire size or axle ratio will cause shift points occur at correspondingly higher or lower vehicle speeds.

pressure take-off point, located at lower left side of extension near the mounting flange (Fig. 2).

(2) Operate transmission in third gear to read pressures and compare speeds shown in chart.

If governor pressures are incorrect at the given vehicle speeds, the governor valve and/or weights are probably sticking. The governor pressure should respond smoothly to changes in mph and should return to 0 to 1-1/2 psi (10 kPa) when vehicle is stopped. High pressure (above 2 psi) when vehicle is stopped will prevent the transmission from downshifting.

***Throttle Pressure***

No gauge port is provided for throttle pressure. Incorrect throttle pressure should only be suspected if part throttle upshift speeds are either delayed or occur too early in relation to vehicle speeds. Engine runaway on either upshifts or downshifts can also be an indicator of incorrect (low) throttle pressure setting.

In no case should throttle pressure be adjusted until the transmission throttle linkage adjustment has been verified to be correct.

## TORQUE CONVERTER STALL TEST

**WARNING: DO NOT LET ANYONE STAND IN FRONT OF VEHICLE DURING TEST.**

The stall test consists of determining the engine speed obtained at full throttle in D position only. This test checks the torque converter stator clutch operation, and the holding ability of the transmission clutches. The transmission oil level should be checked and the engine brought to normal operating temperature before stall operation. **Both the parking and service brakes must be fully applied and front wheels blocked while making this test.**

Do not hold the throttle open any longer than is necessary to obtain a maximum engine speed reading, and never longer than five seconds at a time. If more than one stall check is required, operate the engine at approximately 1,000 rpm in neutral for 20 seconds to cool the transmission fluid between runs. If engine speed exceeds the maximum limits shown, release the accelerator immediately since transmission clutch slippage is indicated.

***Stall Speed Above Specification***

If stall speed exceeds the maximum specified chart by more than 200 rpm, transmission clutch slippage is indicated. Follow the transmission oil pressure and air pressure checks outlined in this section to determine the cause of slippage.

***Stall Speed Below Specification***

Low stall speeds, with a properly tuned engine, indicate torque converter stator clutch problems. A road test will be necessary to identify the exact problem.

If stall speeds are 250-350 rpm below specification and the vehicle operates properly at highway speeds but has poor through-gear acceleration, the stator overrunning clutch is slipping (lock-up and non-lock-up torque converters).

If stall speed and acceleration are normal, but abnormally high throttle opening is required to maintain highway speeds, the stator clutch has seized (non-lock-up torque converter only).

Both of these stator defects require replacement of the torque converter.

***Noise***

A whining or siren-like noise due to fluid flow is normal during stall operation with some torque converters; however, loud metallic noises from loose parts or interference within the assembly indicate a defective torque converter. To confirm that the noise originates within the torque converter, operate the vehicle at light throttle in "D" and "N" on a hoist and listen under the transmission bell housing.

## CLUTCH AND SERVO AIR PRESSURE TESTS

A "NO DRIVE" condition might exist even with correct fluid pressure, because of inoperative clutches or bands. The inoperative units, clutches, bands and servos can be located through a series of tests by substituting air pressure for fluid pressure (Fig. 3).

The front and rear clutches, kickdown servo and low-reverse servo may be tested by applying air pressure to their respective passages after the valve body assembly has been removed. To make air pressure tests, proceed as follows:

**LOADFLITE TRANSMISSION STALL SPEED CHART**

| Engine C.I.D. | Carburetor BBLS | Torque Converter Diameter | Engine Stall Speed rpm |
|---|---|---|---|
| 225 | 1 | 10-3/4 inch | 1800-2100 |
| 318 | 2 • | 10-3/4 inch | 1700-2000 |
| 360 | 4 | 10-3/4 inch | 1700-2000 |

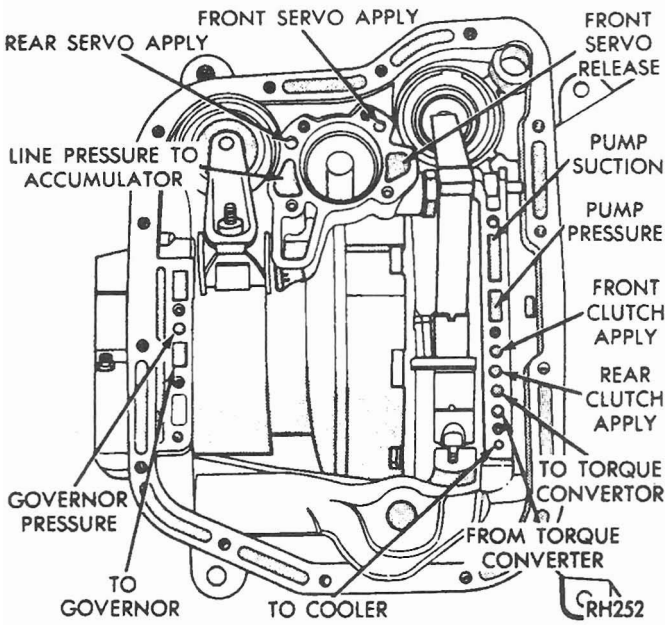



*Fig. 3—Air Pressure Tests*

**Compressed-air supply must be free of all dirt or moisture. Use a pressure of 30 psi.**

### *Front Clutch*

Apply air pressure to front clutch "apply" passage and listen for a dull "thud" which indicates that front clutch is operating. Hold air pressure on for a few seconds and inspect system for excessive oil leaks.

### *Rear Clutch*

Apply air pressure to rear clutch "apply" passage and listen for a dull "thud" which indicates that rear clutch is operating. Also inspect for excessive oil leaks. If a dull "thud" cannot be heard in the clutches, place finger tips on clutch housing and again apply air pressure. Movement of piston can be felt as the clutch is applied.

### *Kickdown Servo (Front)*

Direct air pressure into front servo "apply" passage. Operation of servo is indicated by a tightening of front band. Spring tension on servo piston should release the band.

### *Low - Reverse Servo (Rear)*

Direct air pressure into rear servo "apply" passage. Operation of servo is indicated by a tightening of rear band. Spring tension on servo piston should release the band.

If clutches and servos operate properly, no upshift or erratic shift conditions indicate that malfunctions exist in the valve body.

## FLUID LEAKAGE—TRANSMISSION TORQUE CONVERTER HOUSING AREA

(1) Check for Source of Leakage.

Since fluid leakage at or around the torque converter area may originate from an engine oil leak, the area should be examined closely. Factory fill fluid is dyed red and, therefore, can be distinguished from engine oil.

(2) Prior to removing the transmission, perform the following checks:

When leakage is determined to originate from the transmission, check fluid level prior to removal of the transmission and torque converter.

High oil level can result in oil leakage out the vent located at the top of the front pump housing. If the fluid level is high, adjust to proper level.

After performing this operation, inspect for leakage. If a leak persists, perform the following operation on the vehicle to determine whether it is the torque converter or transmission that is leaking.

### *Leakage Test Probe*

(1) Remove torque converter housing dust shield.

(2) Position vehicle with front lower than back so that accumulated fluid in torque converter housing will drain out. Wipe inside of torque converter housing as dry as possible. A solvent spray followed by compressed air drying is recommended.

(3) Fabricate and fasten test probe (Fig. 4) securely to convenient dust shield bolt hole. Make certain torque converter is cleared by test probe. Tool must be clean and dry.

(4) Run engine at approximately 2,500 rpm with transmission in neutral, for about 2 minutes. Transmission must be at operating temperature.

(5) Stop engine and carefully remove tool.

(6) If upper surface of test probe is dry, there is no torque converter leak. A path of fluid across probe indicates a torque converter leak. Oil leaking under the probe is coming from the transmission pump

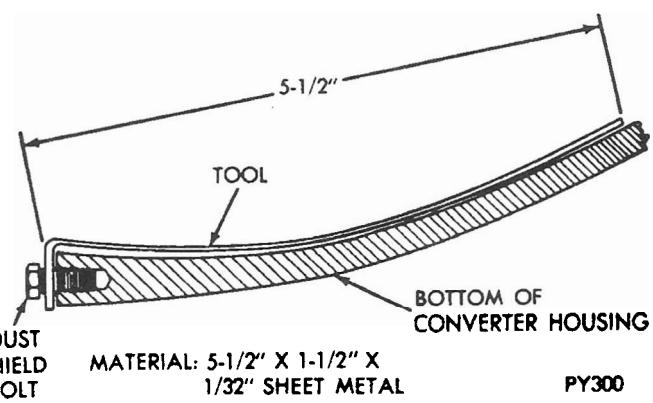



*Fig. 4—Leak Locating Test Probe Tool*

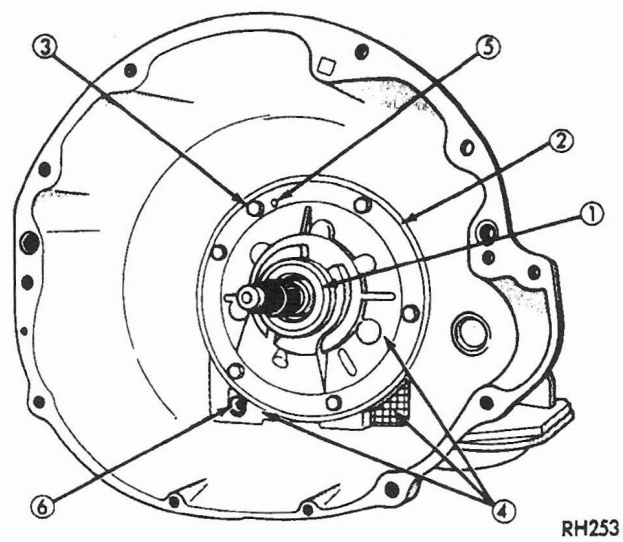



*Fig. 5—Pump Housing Area*

housing area (Fig. 5).

(7) Remove the transmission and torque converter assembly from vehicle for further investigation. The fluid should be drained from the transmission. Reinstall oil pan (with new gasket) at specified torque.

Possible sources of transmission pump housing area fluid leakage shown in (Fig. 5) are:

(1) Torque converter hub seal.

(a) Seal lip cut; check torque converter hub finish.

(b) Bushing moved and/or worn.

(c) Oil return hole in front pump housing plugged or omitted.

(d) Seal worn out (high-mileage vehicles).

(2) Fluid leakage at the outside diameter from pump housing "O" ring seal.

(3) Fluid leakage at the front pump to case bolts.

(4) Fluid leakage due to case or front pump housing porosity.

(5) Oil leakage out the vent.

(6) Kickdown lever shaft access plug.

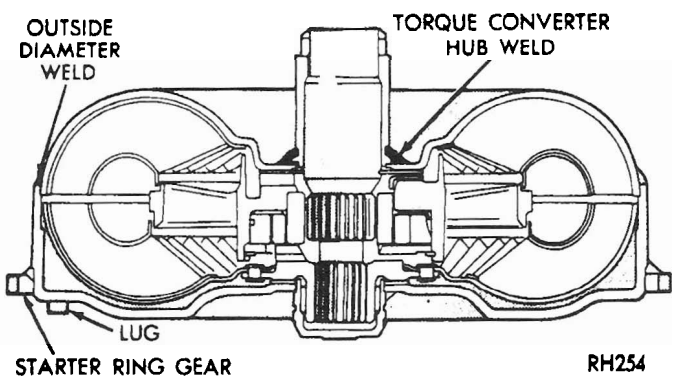



*Fig. 6—Torque Converter (Nonlock-up)*

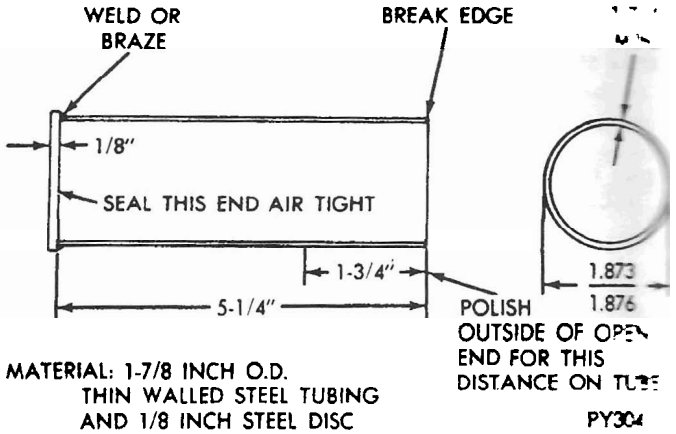



*Fig. 7—A-727 Hub Seal Cup*

### *Torque Converter Leakage (Fig. 6)*

Possible sources of torque converter leakage are:

(a) Torque converter weld leaks at the outside diameter (peripheral) weld.

(b) Torque converter hub weld.

### *Air Pressure Test of Transmission*

Fabricate equipment needed for test as shown in (Figs. 7 through 11).

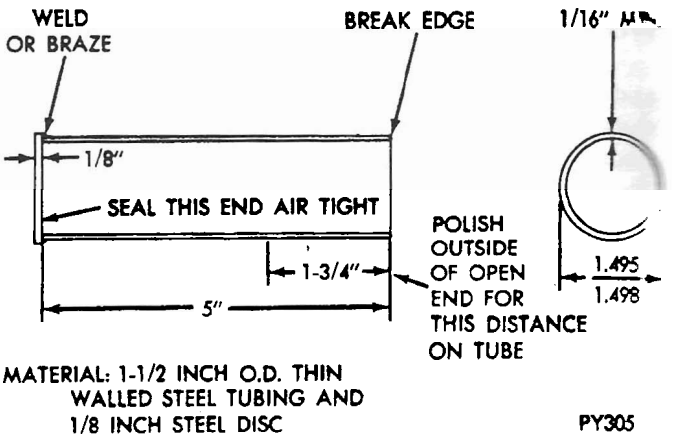



*Fig. 8—A-904T and A-999 Hub Seal Cup*

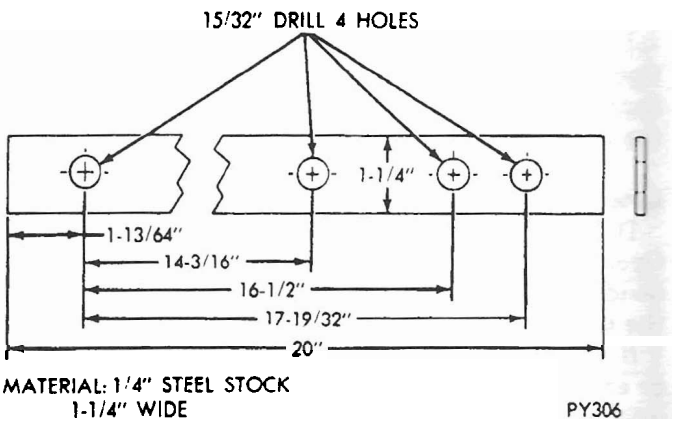



*Fig. 9—Hub Seal Cup Retaining Strap*

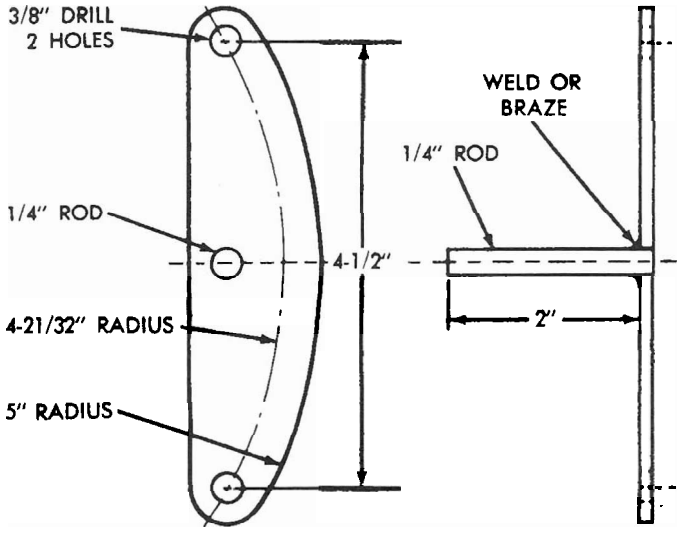



*Fig. 10—A-727 Vent Plug Retainer*

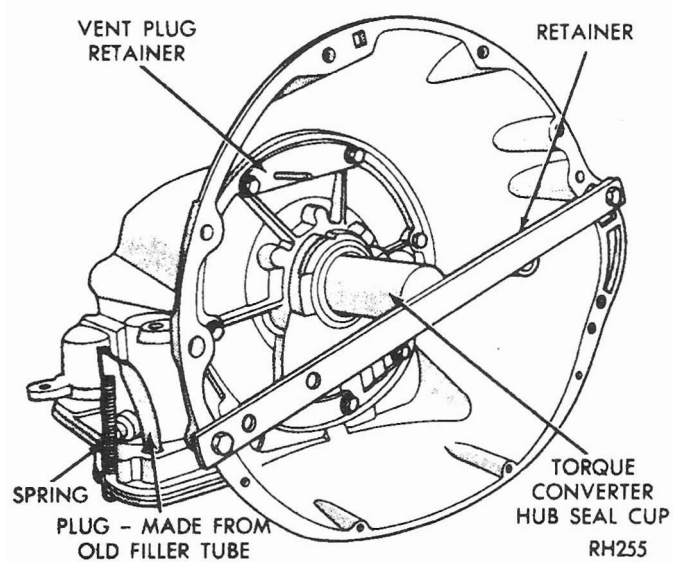



*Fig. 12—Transmission Prepared for Test*

The transmission should be prepared for pressure test as follows after removal of the torque converter:

(1) Install filler tube bore plug, propeller shaft yoke (tie in with cord or wire), flared tube fitting cap (on front cooler line fitting), and a short piece of tubing, flared at one end, on the rear cooler line fitting (Figs. 12 and 13).

(2) Remove necessary front pump housing bolts. Install vent plug (rubber stopper), and vent plug retainer preferably using longer bolts than those removed.

(3) With rotary motion, install torque converter hub seal cup over input shaft, and through the torque converter hub seal until the cup bottoms against the pump gear lugs. Secure with cup retainer strap (Fig. 9), using torque converter housing to engine block retaining bolts.

(4) Attach and clamp hose from nozzle of Tool C-4080 to tubing which is on the rear cooler line fitting (Fig. 13).

(5) Pressurize the transmission using Tool C-4080 until the pressure gauge reads 8 psi. Position transmission so that pump housing and case front may be covered with soapy solution or water. Leaks are sometimes caused by porosity in the case or pump housing. **CAUTION: Do not, under any circumstances, pressurize a transmission to more than 10 psi.**

If a leak source is located, that part and all associated seals and gaskets should be replaced with new parts.

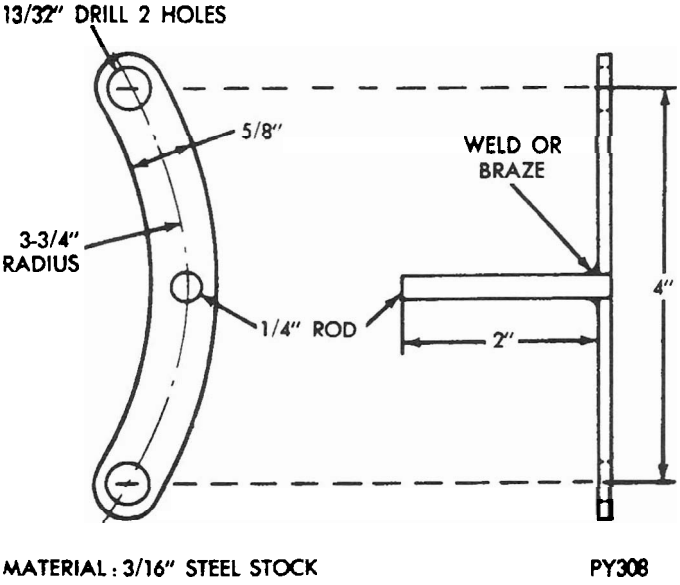



*Fig. 11—A-904T and A-999 Vent Plug Retainer*

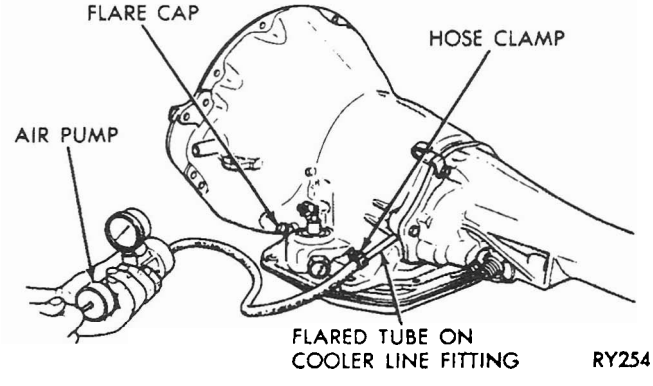
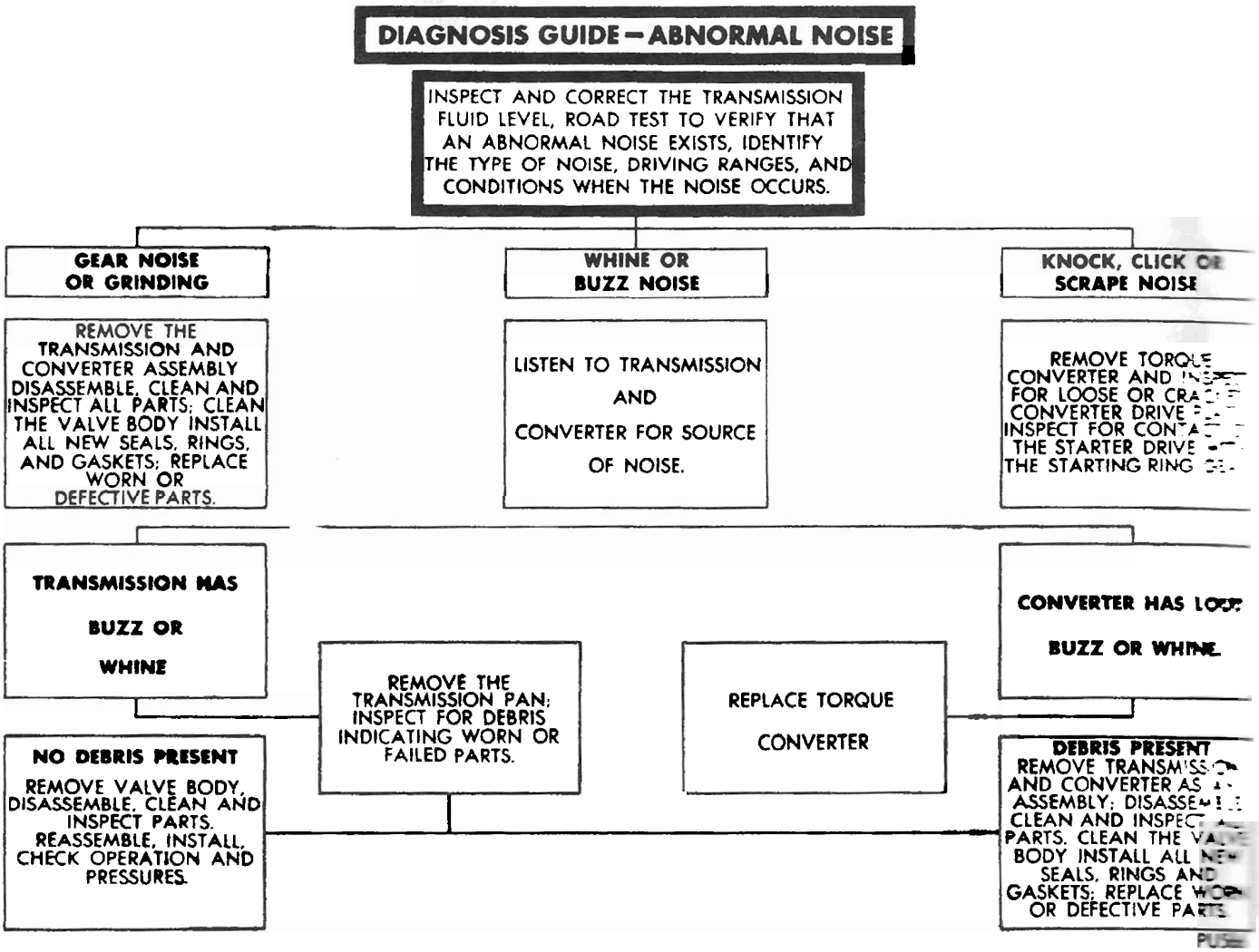



*Fig. 13—Pressurizing Transmission*


DIAGNOSIS GUIDE – ABNORMAL NOISE
INSPECT AND CORRECT THE TRANSMISSION FLUID LEVEL, ROAD TEST TO VERIFY THAT AN ABNORMAL NOISE EXISTS, IDENTIFY THE TYPE OF NOISE, DRIVING RANGES, AND CONDITIONS WHEN THE NOISE OCCURS.
GEAR NOISE OR GRINDING
WHINE OR BUZZ NOISE
KNOCK, CLICK OR SCRAPE NOISE
REMOVE THE TRANSMISSION AND CONVERTER ASSEMBLY DISASSEMBLE, CLEAN AND INSPECT ALL PARTS; CLEAN THE VALVE BODY INSTALL ALL NEW SEALS, RINGS, AND GASKETS; REPLACE WORN OR DEFECTIVE PARTS.
LISTEN TO TRANSMISSION AND CONVERTER FOR SOURCE OF NOISE.
REMOVE TORQUE CONVERTER AND
FOR LOOSE OR CRA
CONVERTER DRIVE
INSPECT FOR CON
THE STARTER DRIVE
THE STARTING RING
TRANSMISSION HAS BUZZ OR WHINE
CONVERTER HAS LOOS
BUZZ OR WHINE
REMOVE THE TRANSMISSION PAN; INSPECT FOR DEBRIS INDICATING WORN OR FAILED PARTS.
REPLACE TORQUE CONVERTER
NO DEBRIS PRESENT
REMOVE VALVE BODY, DISASSEMBLE, CLEAN AND INSPECT PARTS. REASSEMBLE, INSTALL, CHECK OPERATION AND PRESSURES.
DEBRIS PRESENT
REMOVE TRANSMIS
AND CONVERTER AS
ASSEMBLY; DISASSE
CLEAN AND INSPECT
PARTS. CLEAN THE VA
BODY INSTALL ALL NE
SEALS, RINGS AND
GASKETS; REPLACE WO
OR DEFECTIVE PARTS

## DIAGNOSIS GUIDE – VEHICLE WILL NOT MOVE

CHECK THE TRANSMISSION FLUID LEVEL BEFORE STARTING THE ENGINE. IF NO FLUID IS VISIBLE ON THE DIP STICK, ADD FLUID TO THE "L" MARK BEFORE STARTING THE ENGINE. THEN START THE ENGINE WITH THE TRANSMISSION IN NEUTRAL AND LISTEN FOR NOISE.

**NO ABNORMAL NOISE,**
MOVE THE SELECTOR TO A FORWARD DRIVE RANGE AND OBSERVE THE PROPELLER SHAFT FOR TURNING.

**ABNORMAL NOISE.**
STOP ENGINE IMMEDIATELY. REMOVE TRANSMISSION AND CONVERTER AS AN ASSEMBLY; DISASSEMBLE, CLEAN AND INSPECT ALL PARTS; CLEAN THE VALVE BODY, INSTALL ALL NEW SEALS, RINGS, AND GASKETS; REPLACE WORN OR DEFECTIVE PARTS.

**PROPELLER SHAFT TURNS**
BUT REAR WHEELS DO NOT TURN, INSPECT FOR BROKEN REAR AXLE PARTS.

**PROPELLER SHAFT DOES NOT TURN.**
REMOVE THE TRANSMISSION OIL PAN. INSPECT FOR DEBRIS.

**NO DEBRIS**
REMOVE VALVE BODY. DISASSEMBLE CLEAN AND INSPECT ALL PARTS. REASSEMBLE, INSTALL AND CHECK PRESSURES AND OPERATION.

**DEBRIS IS PRESENT.**
REMOVE THETRANSMISSION AND CONVERTER AS AN ASSEMBLY. DISASSEMBLE, CLEAN AND INSPECT ALL PARTS. CLEAN VALVE BODY; INSTALL ALL NEW SEALS, RINGS AND GASKETS; REPLACE WORN OR DEFECTIVE PARTS.

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## DIAGNOSIS GUIDE – FLUID LEAKS

VISUALLY INSPECT FOR SOURCE OF LEAK. IF THE SOURCE OF LEAK CANNOT BE READILY DETERMINED, CLEAN THE EXTERIOR OF THE TRANSMISSION. CHECK TRANSMISSION FLUID LEVEL. CORRECT IF NECESSARY.

THE FOLLOWING LEAKS MAY BE CORRECTED WITHOUT REMOVING THE TRANSMISSION:

MANUAL LEVER SHAFT OIL SEAL
FILLER TUBE 'O' RING
PRESSURE GAUGE PLUG
NEUTRAL START SWITCH
PAN GASKET
OIL COOLER FITTINGS
EXTENSION HOUSING TO CASE GASKET
EXTENSION HOUSING TO CASE BOLTS
EXTENSION HOUSING YOKE SEAL
SPEEDOMETER ADAPTER 'O' RING
FRONT BAND ADJUSTING SCREW

THE FOLLOWING LEAKS REQUIRE REMOVAL OF THE TRANSMISSION AND TORQUE CONVERTER FOR CORRECTION.
TRANSMISSION FLUID LEAKING FROM THE LOWER EDGE OF THE CONVERTER HOUSING; CAUSED BY FRONT PUMP SEAL, PUMP TO CASE SEAL, OR TORQUE CONVERTER WELD.
CRACKED OR POROUS TRANSMISSION CASE.

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## LOADFLITE DIAGNOSIS CHART—GENERAL

| CONDITION | POSSIBLE CAUSE | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HARSH ENGAGEMENT FROM NEUTRAL TO D OR R | Faulty lock-up clutch. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | X |
| | Overrunning clutch inner race damaged. | | | X | | | X | | | | | | | | | | | | | | | | | | | | X | | | | X | | | | | |
| DELAYED ENGAGEMENT FROM NEUTRAL TO D OR R | Overrunning clutch worn, broken or seized. | | | | X | | X | X | X | X | X | X | X | X | X | | | | | | X | | | X | | | | | | X | | | | | |
| | Planetary gear sets broken or seized. | | | | | | X | X | X | X | X | X | X | X | X | | | | | | | | | | | | | | | | | | | | | |
| RUNAWAY UPSHIFT | Rear cluth dragging. | | | | X | | X | | X | | X | | | X | | X | | | | | X | | X | X | | | | | | | | | | | |
| | Worn or faulty rear clutch. | | | | | | | | | | | | | | | | | | | | | | | | | | X | | | | X | | | | |
| NO UPSHIFT | Insufficient clutch plate clearance. | | | | X | | X | X | X | X | | | | | | X | | | | X | X | X | X | X | | | | | | X | | | | | |
| | Faulty cooling system. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3-2 KICKDOWN RUNAWAY | Kickdown band adjustment too tight. | | | | X | | X | | X | | | | | X | | X | X | | | | X | | X | X | | | | | | | | | | | |
| | Hydraulic pressure too high. | | | | | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | |
| NO KICKDOWN OR NORMAL DOWNSHIFT | Breather clogged. | | | | | | X | | | | | | | | | X | | | | | | X | X | | | | | | | | | | | | | |
| | High fluid level. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SHIFTS ERRATIC | Worn or faulty front clutch. | | | | X | | X | | X | | X | X | | X | | X | | | | X | X | X | | X | | | | | | | | | | | |
| | Kickdown servo band or linkage malfunction. | | | | | | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | |
| SLIPS IN FORWARD DRIVE POSITIONS | Governor malfunction. | | | | X | | X | | X | | X | X | | X | | X | | X | | | | | | | | | | | | | | | X | | |
| | Worn or broken reaction shaft support seal rings. | | | | | | | | | | | | | | | | | | | | | | | | | | X | | | | X | | | | |
| SLIPS IN REVERSE ONLY | Governor support seal rings broken or worn. | | | | X | X | X | X | X | X | | X | | X | | | | | | | X | | | X | | | | | | | | | | | |
| | Output shaft bearing and/or bushing damaged. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SLIPS IN ALL POSITIONS | Overrunning clutch not holding. | | | | X | | X | | X | | X | X | | X | | | | | | | | | | | | | | | | | | | | | | |
| | Kickdown band out of adjustment. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NO DRIVE IN ANY POSITION | Incorrect throttle linkage adjustment. | | | | X | | X | | X | | X | X | | | | | | | | | | | | | | | | | | | | | X | | |
| NO DRIVE IN FORWARD DRIVE POSITIONS | Engine idle speed too low. | | | | X | | X | | X | | | | X | | | | | X | | | | | | | | | | | | | | | X | X | |
| | Aerated fluid. | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | X | | | | | |
| NO DRIVE IN REVERSE | Worn or broken input shaft seal rings. | | | | X | X | X | X | X | X | | X | X | X | | | | | | | | | | | | | | | | | | | | | |
| | Faulty oil pump. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DRIVES IN NEUTRAL | Oil filter clogged. | | | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | X | | | | |
| | Incorrect gearshift control linkage adjustment. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DRAGS OR LOCKS | Low fluid level. | | X | | | X | | | | | | X | | | | | | | | | | | | | | | | X | | | | | | | |
| | Low-reverse servo, band or linkage malfunction. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| GRATING, SCRAPING GROWLING NOISE | Valve body malfunction or leakage. | | | | | X | | | | | | | | | | | X | | X | | | | | | | | | | | | | X | X | | |
| | Low-reverse band out of adjustment. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BUZZING NOISE | Hydraulic pressures too low. | | | | | | X | | X | | | X | | X | | | | | | | | | | | | | | | | | | | | X | | |
| HARD TO FILL, OIL BLOWS OUT FILLER TUBE | Engine idle speed too high. | | | | | | | | | | X | | | | | | | | | | | | | | X | X | | | | | | | | | |
| TRANSMISSION OVERHEATS | Stuck lock-up valve. | | X | X | X | | | | X | X | | X | | | | | | | | | | | | | | | | X | X | X | | | | | |
| | Stuck switch valve. | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HARSH UPSHIFT | | | | | X | | | | | | | | | | | X | X | | | | | | | | | | X | | | | | | | | X |
| DELAYED UPSHIFT | | | | | | | | | | | | | | | | X | X | | | X | X | X | X | X | | | | | | | | | | | |
| SLIPS IN REVERSE OR MANUAL LOW | | | | | | X | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | |

## DIAGNOSIS CHART—LOCK-UP TORQUE CONVERTER

| POSSIBLE CAUSE | NO LOCK-UP | WILL NOT UNLOCK | STAYS LOCKED UP TO TOO LOW A SPEED IN DIRECT | LOCKS UP OR DRAGS IN LOW OR SECOND | STALLS OR IS SLUGGISH IN REVERSE | LOUD CHATTER DURING LOCK-UP ENGAGEMENT—(COLD) | VIBRATION OR SHUDDER DURING LOCK-UP ENGAGEMENT | VIBRATIONS AFTER LOCK-UP ENGAGEMENT | VIBRATION WHEN "REVED' IN NEUTRAL | OVERHEATING; OIL BLOWING OUT DIPSTICK OR PUMP SEAL | SHUDDER AFTER LOCK-UP ENGAGEMENT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| FAULTY OIL PUMP | X | | | X | X | | X | | | | X |
| STICKING GOVERNOR VALVE | X | X | X | | | | | | | | |
| PLUGGED COOLER, LINES OR FITTINGS | | | | | X | | | | | X | X |
| VALVE BODY MALFUNCTION | X | X | X | X | X | | X | | | | X |
| STUCK SWITCH VALVE | X | X | X | X | X | | | | | X | |
| STUCK LOCK-UP VALVE | X | X | X | | | | | | | | |
| STUCK FAIL-SAFE VALVE | X | X | X | X | | | | | | | |
| STUCK LOCK-UP SOLENOID | X | | X | | | | | | | | |
| SOLENOID WIRING DISCONNECTED | X | | | | | | | | | | |
| FAILED LOCK-UP SOLENOID | X | | | | | | | | | | |
| FAILED LOCK-UP RELAY | X | | X | | | | | | | | |
| FAULTY TORQUE CONVERTER: | X | | | | | X | X | X | | | X |
| OUT OF BALANCE | | | | | | | | | X | | |
| FAILED LOCKING CLUTCH | X | | | | | X | | | | | X |
| LEAKING TURBINE HUB SEAL | X | | | | | X | | | | | |
| ALIGN EXHAUST SYSTEM | | | | | | | | X | | | X |
| TUNE ENGINE | | | | | | | X | X | | | X |
| FAULTY INPUT SHAFT OR SEAL RING | X | | | | X | | | | | | |
| THROTTLE LINKAGE MISADJUSTED | | | | | | | | X | | | X |

CONDITION

## LUBRICATION

Inspect fluid level on dipstick every six months with engine idling and transmission in neutral position and vehicle on **level** ground. A properly filled transmission will read near the "add" mark when fluid temperature is 70 degree fahrenheit (21 degrees Celsius) and near (but not over) the "full" mark at 180 degrees fahrenheit (82 degrees Celsius) (average operating temperature).

### *Fluid and Filter Changes*

Refer to "Lubrication and Maintenance" Group 0 for mileage intervals.

Severe usage as defined below, requires that fluid and filter be changed and bands adjusted every 12,000 miles (19 000 kilometers).

(1) More than 50% operation in heavy city traffic during hot weather (above 90°F.) (32°C.).

(2) Police, Taxi, Limousine, Commercial Type Operation, and Trailer Tow.

**NOTES:**

(1) When the factory fill fluid is changed as recommended above, MOPAR ATF PLUS (Automatic Transmission Fluid) Type 7176 should be used. A band adjustment and filter change should be made at the time of the oil change.

(2) If the transmission is disassembled for any reason, the fluid and filter should be changed, and the bands adjusted.

### *Drain and Refill*

(1) Raise vehicle on a hoise. Place a drain container with a large opening, under transmission oil pan.

(2) Loosen pan bolts and tap the pan at one corner to break it loose allowing fluid to drain, then remove the oil pan.

(3) If necessary, adjust the reverse band.

(4) Install a new filter on bottom of the valve body and tighten retaining screws to 35 in. lbs. (4 N·m).

(5) Clean the oil pan. Make sure the round magnet is located over the bump in the front, right hand corner of the oil pan. Install oil pan using a new gasket. Tighten oil pan bolts to 150 in. lbs. (17 N·m).

(6) Pour four quarts of MOPAR ATF PLUS (Automatic Transmission Fluid) Type 7176 through the filler tube.

(7) Start engine and allow to idle for at least two minutes. Then, with parking brake on, move selector lever momentarily to each position, ending in neutral position.

(8) Add sufficient fluid to bring level to the "ADD" mark.

Recheck fluid level after transmission is at operating temperature. The level should be between the **"FULL"** mark and **"ADD"** mark with vehicle on **level** ground.

To prevent dirt from entering transmission, be certain that dipstick cap is fully seated onto the filler tube.

## GEARSHIFT LINKAGE ADJUSTMENT (Column Shift)(Fig. 1)

**When it is necessary to disassemble linkage from levers which use plastic grommets as retainers, the grommets should be replaced with new ones.** Use a prying tool to force rod from grommet in lever (pry only where grommet and rod attach—on the rod itself), then cut away old grommet. Use pliers to snap new grommet into lever and rod. Lubricate grommet.

(1) To insure proper adjustment, make sure adjustable swivel block is free to turn on shift rod. Disassemble and clean or repair parts to assure free action as necessary.

(2) Place gearshift lever in "P" (park) position.

(3) With all linkage assembled and the adjusting swivel lock bolt loose, move shift lever on transmission all the way to rear detent (park) position.

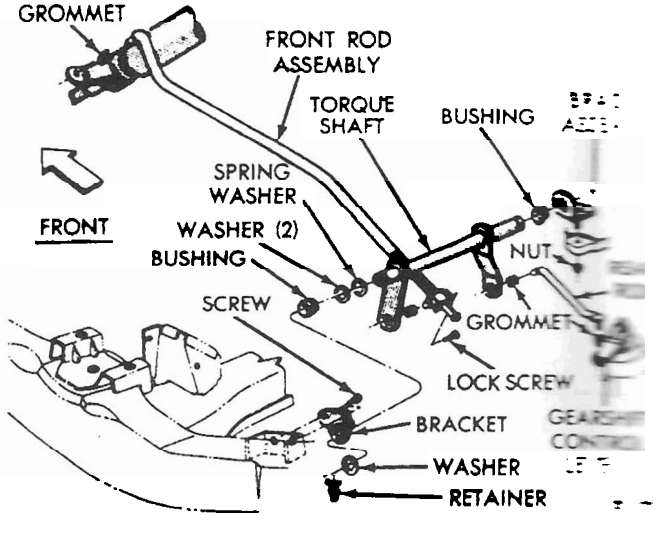



*Fig. 1—Column Gearshift Linkage Adjust*

(4) Tighten adjustment swivel lock bolt to 90 in. lbs. (10 N·m).

(5) Check adjustment as follows:

(a) Detent position for neutral and drive should be within limits of hand lever gate stops.

(b) Key start must occur only when shift lever is in "park" or "neutral" positions.

## THROTTLE ROD ADJUSTMENT

With engine at operating temperature and carburetor off fast idle cam, adjust idle speed of engine using a tachometer. Refer to "Fuel System" Group 14, for idle speed Specifications and carburetor linkage adjustment.

## ADJUSTMENT PROCEDURE (Figs. 2 or 3)

(1) Perform transmission throttle rod adjustment while engine is at normal operating temperature otherwise make sure carburetor is not on fast idle cam.

(2) Raise vehicle on hoist to make adjustment at transmission throttle lever.

(3) Loosen adjustment swivel lock screw.

(4) To insure proper adjustment, swivel must be free to slide along flat end of throttle rod so that preload spring action is not restricted. Disassemble and clean or repair parts to assure free action, if necessary.

(5) Hold transmission lever firmly forward against its internal stop and tighten swivel lock screw to 100 in. lbs. (11 N·m).

(6) The adjustment is finished and linkage backlash was automatically removed by the preload spring.

(7) If lubrication is required, refer to Lubrication Group 0.

(8) Lower vehicle, reconnect choke if disconnected, and test linkage freedom of operation by moving throttle rod rearward, slowly releasing it to confirm it will return fully forward.

## BAND ADJUSTMENTS

### *Kickdown Band (Front)*

The kickdown band adjusting screw is located on left side of the transmission case (Fig. 4).

(1) Loosen lock nut and back off lock nut approximately five turns. Test adjusting screw for free turning in the transmission case.

(2) Using wrench, Tool C-3380-A with adapter C-3705, tighten band adjusting screw 47 to 50 in. lbs. (5 N·m). If adapter C-3705 is not used, tighten adjusting screw to 72 in. lbs. (8 N·m) which is the true torque.

(3) Back off adjusting screw the number of turns listed in "Specifications". Hold adjusting screw in this position and tighten lock nut to 30 ft. lbs. (41 N·m).

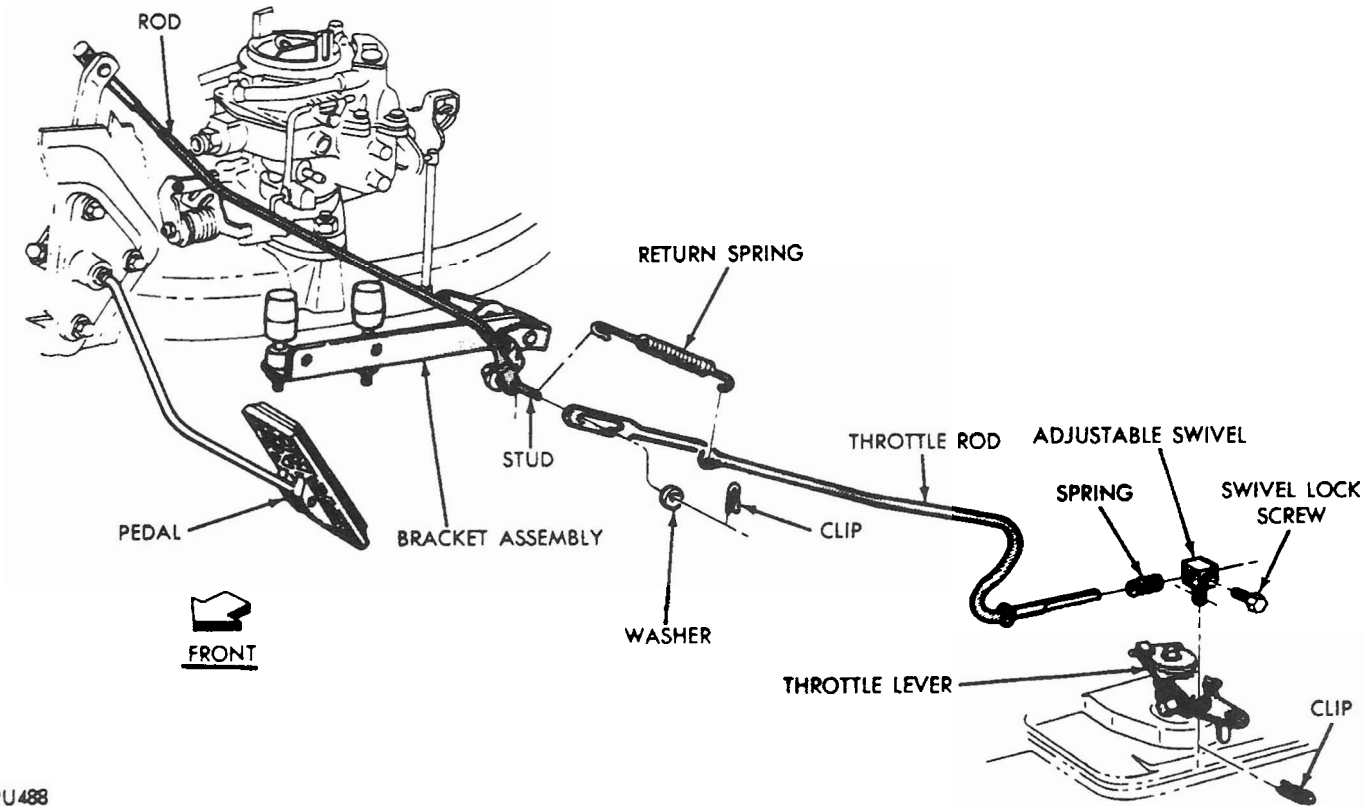



*Fig. 2—Throttle Rod Adjustment (6 Cylinder Models)*

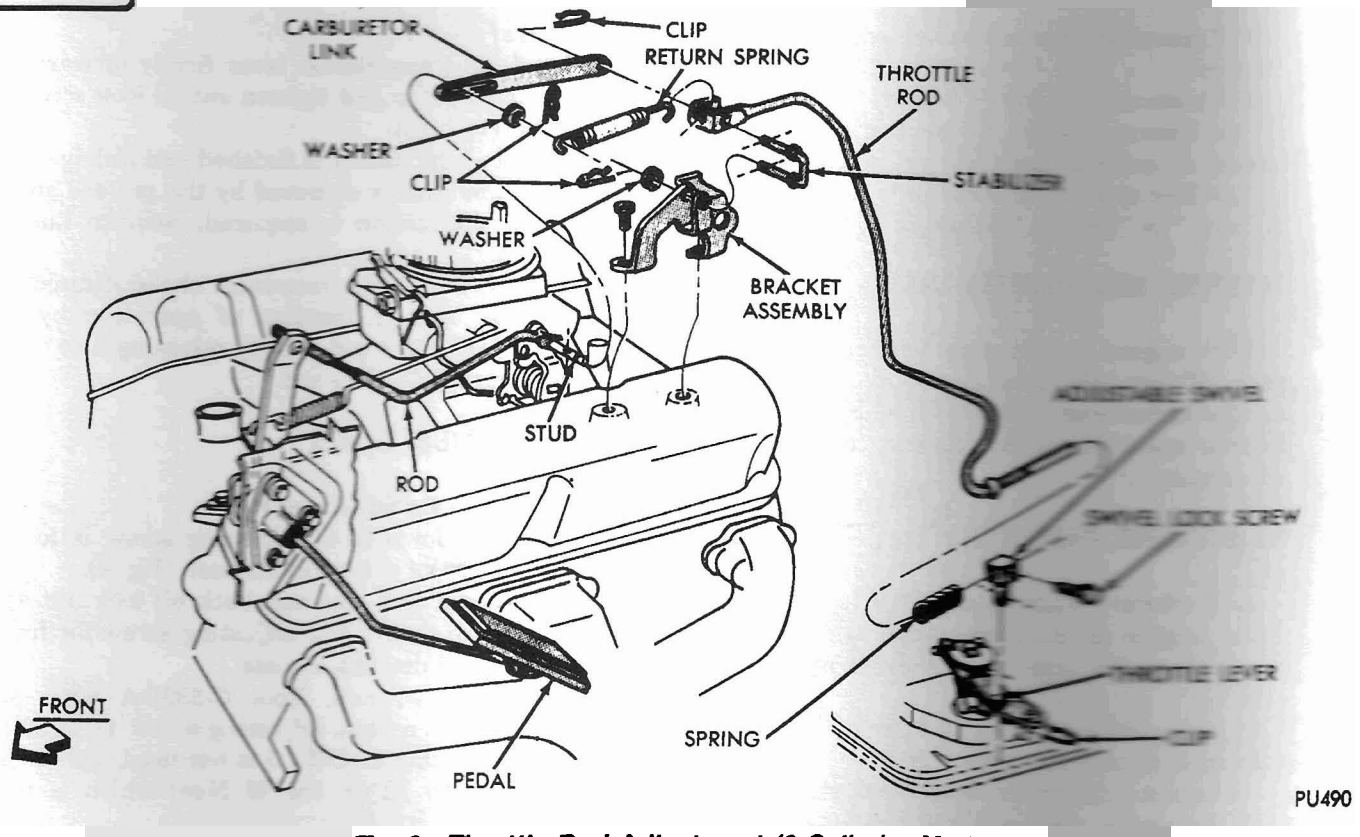



*Fig. 3—Throttle Rod Adjustment (8 Cylinder Models*

### *Low-Reverse Band (Rear)*

(1) Raise vehicle, drain transmission fluid from loosened oil pan and remove oil pan.

(2) Loosen adjusting screw lock nut and back off lock nut approximately five turns (Fig. 5). Test adjusting screw for free turning in the lever.

(3) Using wrench, Tool C-3380-A, tighten band adjusting screw to 72 in. lbs. (8 N·m).

(4) Back off adjusting screw the number of turns listed in "Specifications". Hold adjusting screw in this position and tighten lock nut to 25 ft. lbs. (34 N·m).

(5) Reinstall oil pan using a new gasket. Tighten oil pan bolts to 150 in. lbs. (17 N·m).

(6) Fill transmission with [illegible] ATF PLUS (Automatic Transmission Fluid [illegible]).

## HYDRAULIC CONTROL PRESSURE ADJUSTMENTS

### *Line Pressure*

An incorrect throttle [illegible] will cause incorrect line pressure [illegible] even though line pressure adjustment is correct. Always inspect and correct throttle pressure [illegible] before adjusting the line pressure.

The approximate [illegible] varies, measu-

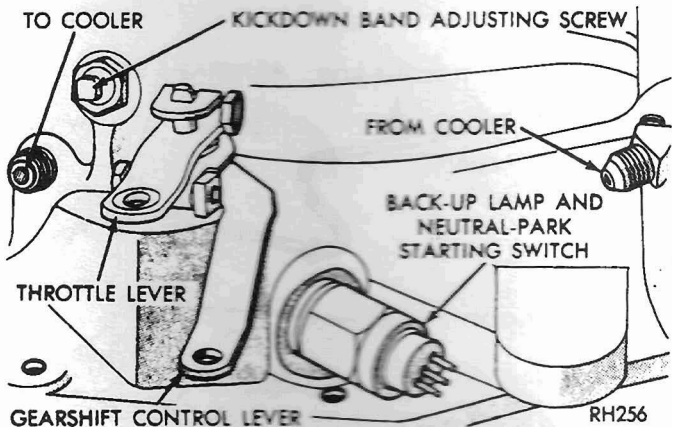



*Fig. 4—External Controls and Adjustments*

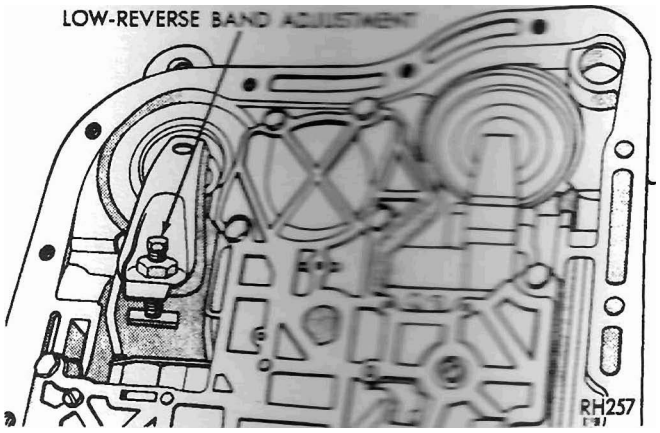



*Fig. 5—Low-Reverse Band Adjustment*

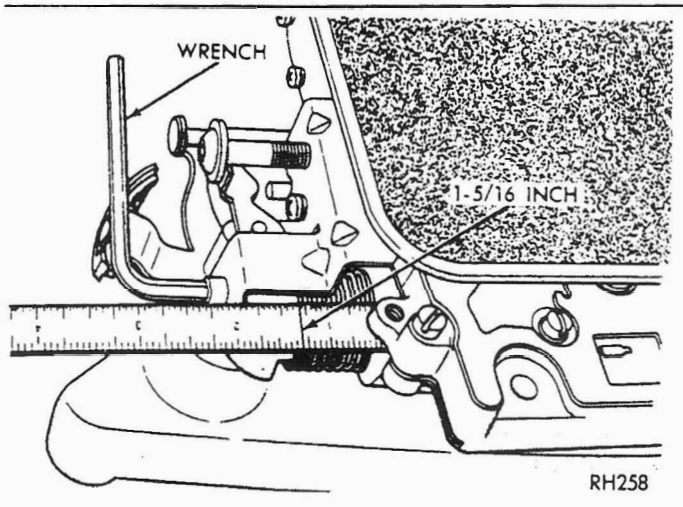



*Fig. 6—Line Pressure Adjustment*

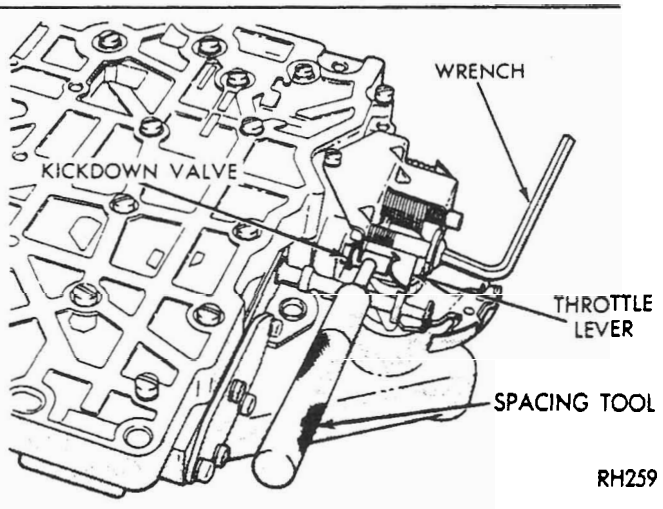



*Fig. 7—Throttle Pressure Adjustment*

ured from valve body to inner edge of adjusting nut (Fig. 6). However, due to manufacturing tolerances, the adjustment can be varied to obtain specified line pressure.

The adjusting screw may be turned with an Allen wrench. One complete turn of the adjusting screw changes closed throttle line pressure approximately 1 2/3 psi. Turning adjusting screw counterclockwise increases pressure, and clockwise decreases pressure.

### *Throttle Pressure*

Throttle pressures cannot be tested accurately; therefore, the adjustment should be measured if a malfunction is evident.

(1) Insert gauge pin of Tool C-3763 between the throttle lever cam and kickdown valve (Fig. 7).

(2) By pushing in on tool, compress kickdown valve against its spring so throttle valve is completely bottomed inside the valve body.

(3) As force is being exerted to compress spring, turn throttle lever stop screw with allen wrench until head of screw touches the throttle lever tang with throttle lever cam touching tool and the throttle valve bottomed. Be sure adjustment is made with spring fully compressed and valve bottomed in the valve body.

## SERVICE IN VEHICLE

### GENERAL INFORMATION

Various transmission components can be removed for repairs without removing the transmission from the vehicle. The removal, reconditioning, and installation procedures for these components are covered here.

### SPEEDOMETER PINION GEAR

**Any time the speedometer pinion adapter is removed, a NEW "O" ring (black in color) must be installed on the outside diameter of the adapter.**

### *Removal and Installation*

Rear axle gear ratio and tire size determines pinion gear requirements.

(1) Place drain pan under speedometer adapter.

(2) Remove bolt and retainer securing speedometer pinion adapter in the extension housing (Fig. 1).

(3) With cable housing connected, carefully work adapter and pinion out of the extension housing.

(4) If transmission fluid is found in cable housing, replace seal in the adapter (Fig. 2). Start seal and retainer ring in the adapter, then push them into adapter with Tool C-4004 until tool bottoms (Fig. 3).

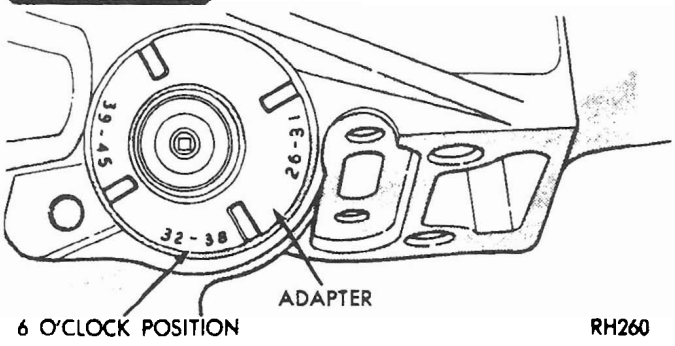



*Fig. 1—Speedometer Pinion and Adapter*

**Before installing pinion and adapter assembly, make sure adapter flange and its mating area on extension housing are perfectly clean. Dirt or sand will cause misalignment resulting in speedometer pinion gear noise.**

(5) Note number of gear teeth and install speedometer pinion gear into adapter.

(6) Rotate the speedometer pinion gear and adapter assembly so that the number on the adapter, corresponding to the number of teeth on the gear, is in the 6 o'clock position as the assembly is installed (Fig. 1).

(7) Install retainer and bolt, with retainer tangs in adapter positioning slots. Tap adapter firmly into the extension housing and tighten retainer bolt to 100 in. lbs. (11 N·m). Refill transmission.

## NEUTRAL STARTING AND BACK-UP LAMP SWITCH (Fig. 4)

### *Replacement and Test*

The neutral starting switch is the center terminal of the 3 terminal switch. It provides ground for the starter solenoid circuit through the selector lever in only **Park** and **Neutral** positions.

(1) To test switch, remove wiring connector from switch and test for continuity between center pin of switch and transmission case. Continuity should exist only when transmission is in **Park** or **Neutral.**

(2) Check gearshift linkage adjustment before replacing a switch that tests bad.

(3) Unscrew switch from transmission case allowing fluid to drain into a container. Move selector lever to **Park** and then to **Neutral** positions, and inspect to see that the switch operating lever fingers are centered in switch opening in the case.

(4) Screw switch with new seal into transmission case and tighten to 25 ft. lbs. (34 N·m). Retest switch with the test lamp.

(5) Add automatic transmission fluid to transmission to bring up to proper level.

(6) The back-up lamp switch circuit is through the two outside terminals of the 3 terminal switch.

(7) To test switch, remove wiring connector from switch and test for continuity between the two outside pins.

(8) Continuity should exist only with transmission in Reverse position.

(9) No continuity should exist from either pin to the case.

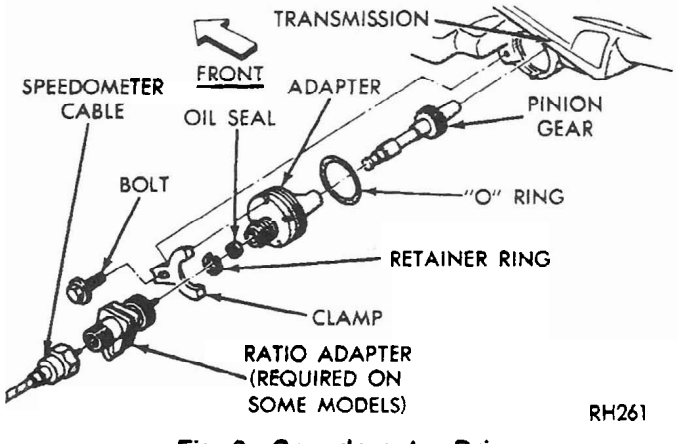



*Fig. 2—Speedometer Drive*

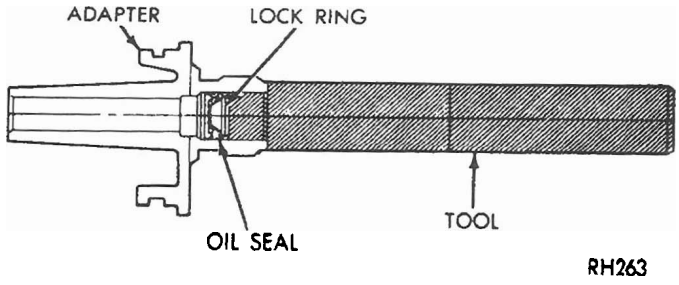



*Fig. 3—Install Speedometer Pinion Seal*

## EXTENSION HOUSING YOKE SEAL

### *Replacement*

(1) Mark parts for reassembly then disconnect the propeller shaft at rear universal joint. Carefully pull

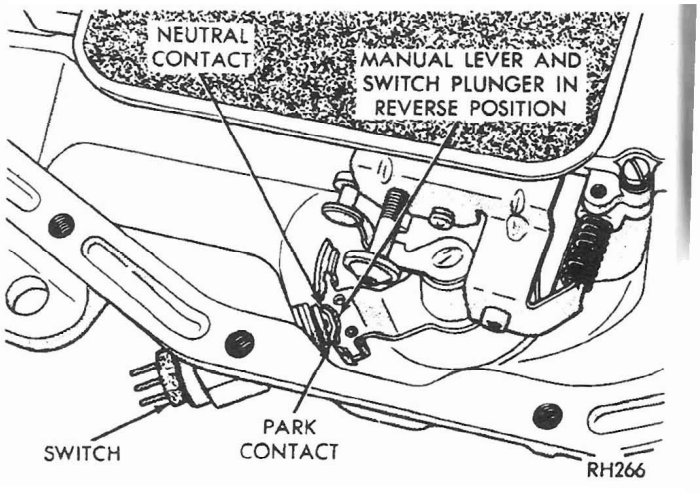



*Fig. 4—Start and Back-Up Lamp Switch*

shaft yoke out of the transmission extension housing.

**Be careful not to scratch or nick ground surface on sliding spline yoke during removal and installation of the shaft assembly.**

(2) Remove oil seal with Tool C-3985 (Fig. 5).

(3) To install a new seal, position seal in opening of extension housing and drive it into the housing with Tool C-3995 or C-3972 (Fig. 6).

(4) Carefully guide front universal joint yoke into extension housing and on the mainshaft splines. Align marks made at removal and connect propeller shaft to rear axle pinion shaft yoke.

## EXTENSION HOUSING BUSHING AND OUTPUT SHAFT BEARING

### *Extension Removal*

(1) Mark parts for reassembly then disconnect propeller shaft at rear universal joint. Carefully pull shaft assembly out of the extension housing.

(2) Remove speedometer pinion and adapter assembly (Fig. 1). Drain approximately two quarts of fluid from the transmission.

(3) Remove bolts securing extension housing to the crossmember. Raise transmission slightly with service jack, then remove center crossmember and support assembly.

(4) Remove extension housing to transmission bolts.

When removing or installing extension housing (step 6), the gearshift lever must be in "1" (low) position. This positions parking lock control rod rearward so it can be disengaged or engaged with the parking lock sprag.

(5) Remove screws, plate, and gasket from bottom of extension housing mounting pad. Spread large snap ring from output shaft bearing (Fig 7).

With snap ring spread as far as possible, carefully tap extension hosuing off the output shaft bearing. Carefully pull extension housing rearward, to allow parking lock control rod knob to clear parking sprag, then remove the housing.

### *Bearing Replacement*

(1) Using heavy-duty snap ring pliers, remove the output shaft bearing rear snap ring and remove bearing from the shaft (Fig. 8).

(2) Install a new bearing on shaft with outer race ring groove toward front, then install rear snap ring. A-727 has a snap ring in front of bearing; A-904T and A-999 do not.

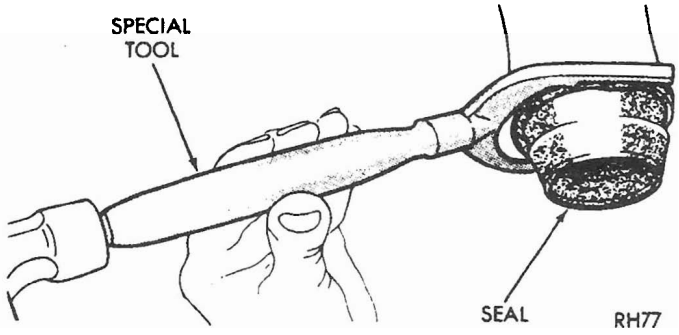



*Fig. 5—Remove Extension Housing Yoke Seal*

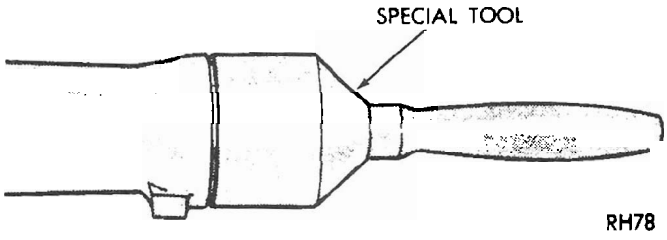



*Fig. 6—Install Extension Housing Yoke Seal*

### *Bushing Replacement*

(1) Remove oil seal with Tool C-3985 (Fig. 5).

(2) **A-904T and A-999:** Press or drive out bushing with Tool C-3996 (Fig. 9).

**A-727:** Remove bushing in the same manner with Tool C-3974.

(3) **A-904T and A-999:** Slide a new bushing on installing end of Tool C-3996. Align oil hole in bushing with oil slot in the housing, then press or drive bushing into place (Fig. 9).

**A-727:** Using Tool C-3974, install a new bushing in same manner.

(4) **A-904T and A-999:** Drive a new oil seal into housing with Tool C-3995 (Fig. 6).

**A-727:** Using Tool C-3972, install a new oil seal in same manner.

### *Extension Installation*

(1) Place a new extension housing gasket on the transmission case. Position the output shaft bearing retaining snap ring in extension housing. Slide extension housing on output shaft guiding the parking lock

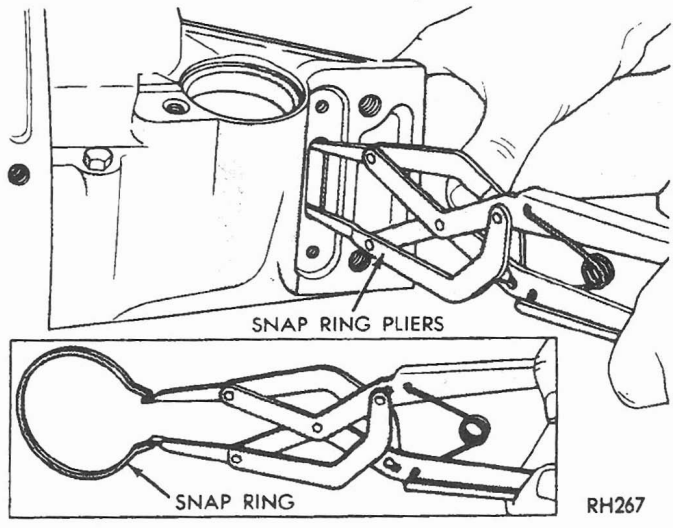



*Fig. 7—Remove or Install Extension Housing*

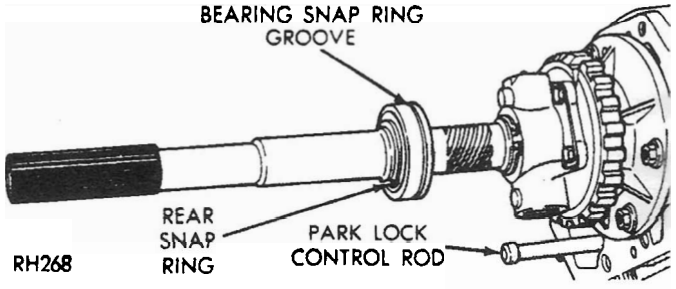



*Fig. 8—Output Shaft Bearing*

control rod knob past the parking sprag. While spreading large snap ring in housing (Fig. 7), carefully tap housing into place, then release the snap ring. Make sure snap ring is fully seated in bearing outer race ring groove.

(2) Install and tighten extension housing bolts to 32 ft. lbs. (43 N·m).

(3) Install gasket, plate, and screws on bottom of the extension housing mounting pad.

(4) Install the center crossmember and rear mount assembly, tighten retaining bolts. Lower transmission to install extension housing to support bolts and tighten to 50 ft. lbs. (68 N·m).

(5) Install the speedometer pinion and adapter.

(6) Carefully guide front universal joint yoke into extension housing and on the output shaft splines. Align marks made at removal and connect propeller shaft to rear axle pinion shaft yoke.

(7) Add automatic transmission fluid to transmission to bring up to proper level.

## GOVERNOR AND PARKING GEAR

### *Removal*

(1) Remove extension housing and output shaft bearing as previously described.

(2) Carefully pry snap ring from weight end of governor valve shaft (Fig. 10). Slide valve and shaft assembly out of governor body.

(3) Remove large snap ring from weight end of governor body, lift out governor weight assembly.

(4) Remove snap ring from inside governor weight, remove inner weight and spring from the outer

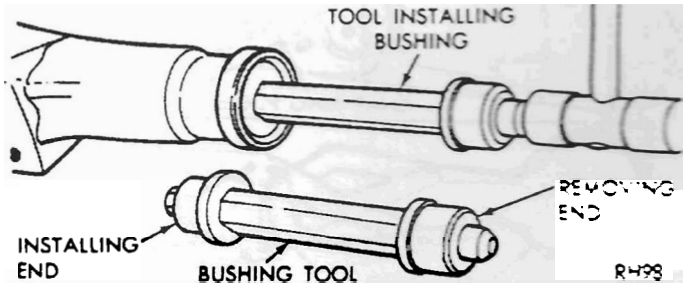



*Fig. 9—Replace Extension Housing Bushing*

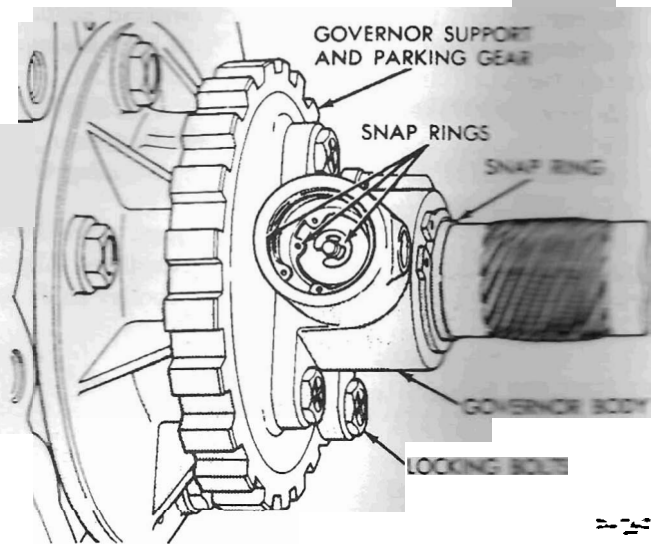



*Fig. 10—Governor Snap Rings*

weight. Figure 11 shows a disassembled view of the governor assembly.

(5) Remove snap ring from [illegible], then slide governor and support [illegible] output shaft. Remove the [illegible] governor body and screen from the [illegible]

### *Cleaning and Inspection*

Figure 11 shows a disassembled view of the governor assembly.

Insepct all parts for [illegible] weight for free [illegible] weight for free [illegible] valve for free [illegible] weights and valve [illegible] clean and dry. Rough surfaces may be removed with crocus cloth. Wash governor screen in clean solvent. Governor seal rings [illegible]

Inspect governor weight springs for distortion. Inspect rugs on support gear for burrs, nicks or other damage. Governor [illegible] clean [illegible] before assembly.

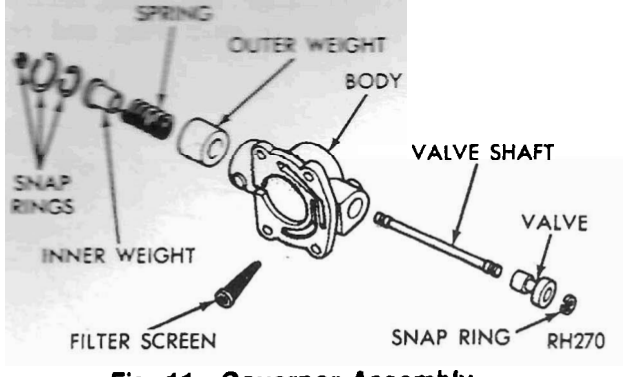



*Fig. 11—Governor Assembly*

### Installation

(1) Assemble governor body and screen to the support and tighten bolts finger tight. Make sure oil passage of governor body aligns with passage in the support.

(2) Position support and governor assembly on the output shaft. Align assembly so valve shaft hole in governor body aligns with hole in the output shaft, then slide assembly into place. Install snap ring behind governor body (Fig. 10). Tighten the body to support bolts to 95 in. lbs. (11 N·m). The support bolts have a self-locking nylon patch and can be reused.

(3) Assemble governor weights and spring, and secure with snap ring inside of large governor weight. Place weight assembly in governor body and install snap ring.

(4) Place governor valve on the valve shaft, insert assembly into the body and through governor weights. Install valve shaft retaining snap ring. Inspect valve and weight assembly for free movement after installation.

(5) Install output shaft bearing and extension housing as previously described.

## PARKING LOCK COMPONENTS

### Removal

(1) Remove extension housing as previously described.

(2) Slide shaft out of extension housing to remove the parking sprag and spring (Fig. 12). Remove snap ring and slide the reaction plug and pin assembly out of the housing.

(3) To replace the parking lock control rod, refer to "Valve Body—Removal and Installation."

### Inspection

Inspect sprag shaft for scores and free movement in the housing and sprag. Inspect sprag and control rod springs for distortion and tension. Inspect square lug on sprag for broken edges, also lugs on parking gear for damage. Inspect knob on end of control rod for nicks, burrs, and free turning.

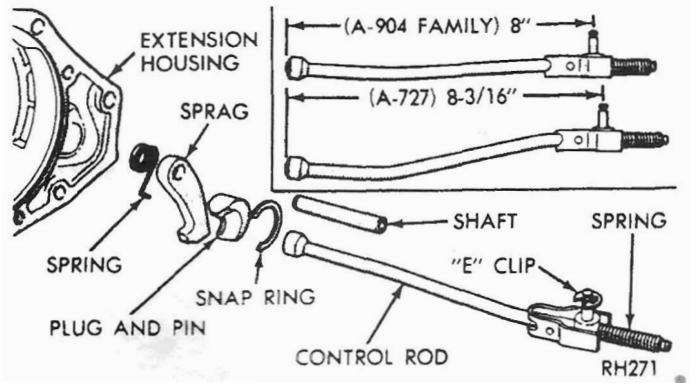



*Fig. 12—Parking Lock Components*

### Assembly

(1) Install reaction plug and pin assembly in the housing and secure with snap ring (Fig. 12).

(2) Position sprag and spring in housing and insert the shaft. Make sure square lug on sprag is toward parking gear, and spring is positioned so it moves sprag away from the gear.

(3) Install extension housing.

## VALVE BODY AND ACCUMULATOR PISTON REMOVAL

(1) Raise vehicle on a hoist.

(2) Loosen oil pan bolts, tap the pan to break it loose allowing fluid to drain, then remove oil pan.

(3) Loosen clamp bolts and remove throttle and shift levers from transmission.

(4) Pull wire connector from combination back-up lamp/neutral start switch.

(5) Unscrew and remove switch from transmission case (Fig. 4).

(6) Disconnect electronic lock-up solenoid wire from inside of wiring connector at rear of transmission case, if so equipped.

(7) Place a drain pan under transmission, then remove the ten hex-head valve body transmission case bolts. Hold valve body in position while removing the bolts.

(8) While lowering valve body down out of transmission case, pull it forward out of the case. If necessary, rotate propeller shaft to align parking gear and sprag to permit knob on end of parking control rod to pass the sprag.

(9) Remove accumulator piston and spring from transmission case. Inspect piston for nicks, scores, and wear. Inspect spring for distortion. Inspect rings for freedom in piston grooves and wear or breakage. Replace parts as required.

### Manual Lever Shaft Seal

(1) If valve body manual lever shaft oil seal requires replacement, drive it out of the case with a punch.

*Fig. 13—Install Manual Lever Shaft Seal*

(2) Remove top and bottom screws from spring retainer and adjustment screw bracket.

(3) Hold spring retainer firmly against spring force while removing last retaining screw from side of valve body.

(4) Remove spring retainer, with line and throttle pressure adjusting screws (do not disturb setting) and the line pressure and switch valve regulator springs.

(5) Slide switch valve and regulator valve out of their bores.

(6) Remove screws from lock-up module (or stiffener plate) and carefully remove tube and lock-up module (or stiffener plate). Disassemble lock-up module, tagging springs. Nonlock-up A-904T, for California models, use an empty lock-up body instead of a stiffener plate.

(7) Remove transfer plate retaining screws and lift off transfer plate and separator plate assembly.

(8) Remove lock-up solenoid retaining screw and pull solenoid from its bore in transfer plate, if so equipped.

(9) Remove three screws from separator plate and separate parts for cleaning (Fig. 4).

(10) Remove rear clutch ball check, reverse servo ball check, and line pressure regulator valve screen from separator plate for cleaning (Fig. 4).

(11) Remove the seven balls from valve body as shown in Figure 5.

## LOCK-UP MODULE (Fig. 3)

(1) Remove end cover.

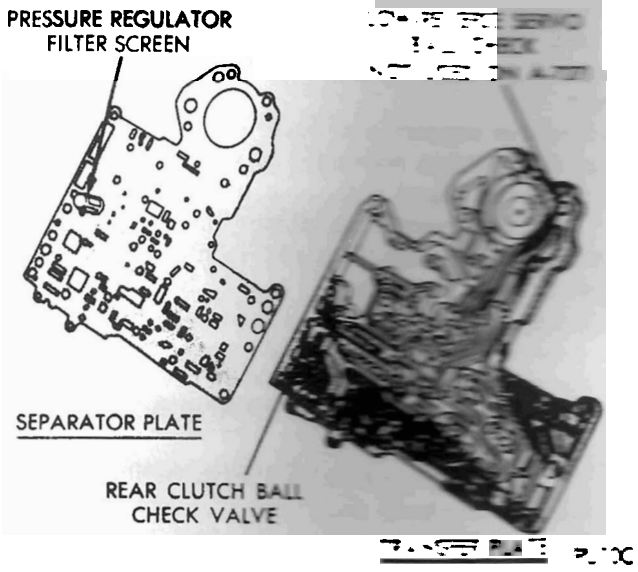



*Fig. 4—Transfer Plate and Separator Plate*

(2) Remove lock-up spring and valve

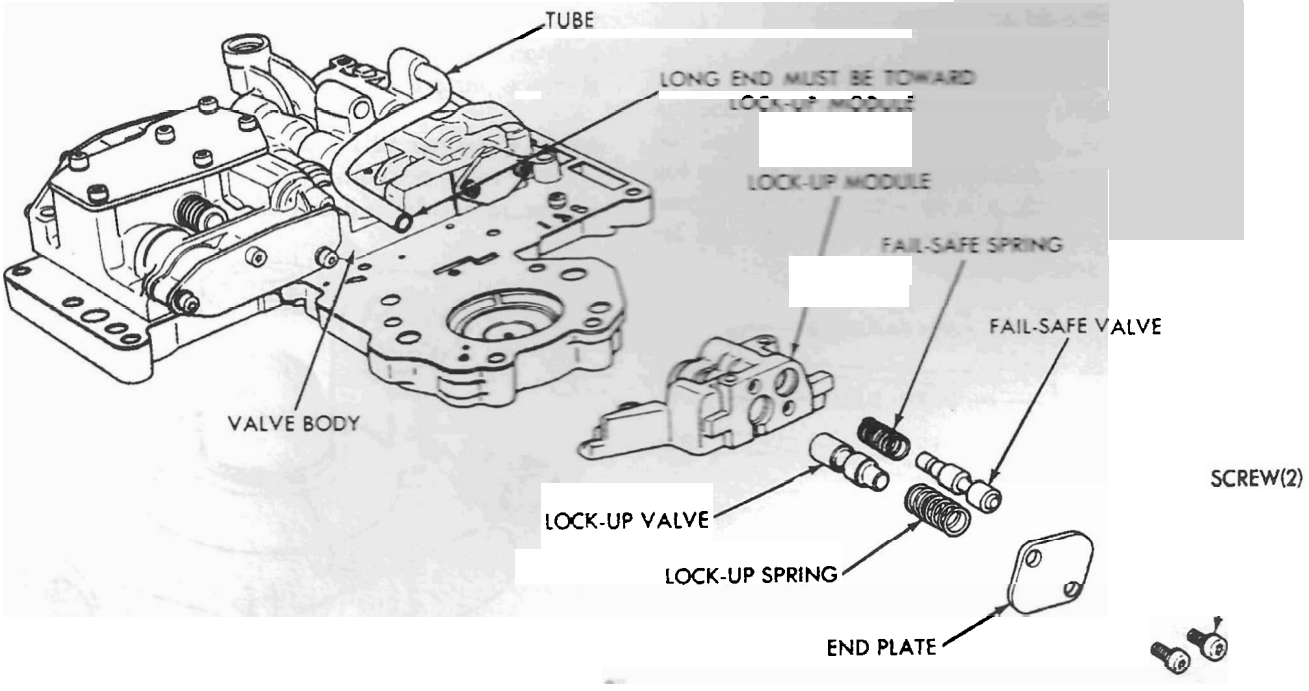
(3) Remove fail-saft valve and spring

Tag these springs as they are removed for reassembly identification.

### *Shuttle Valve and Governor Plugs (Fig. 6)*

(1) Turn valve body over and remove shuttle valve cover plate.

(2) Remove governor plug end plate (Fig. 6) and slide out the shuttle valve thrust plug and spring, the 1-2 shift valve governor plug and the 1-2 shift

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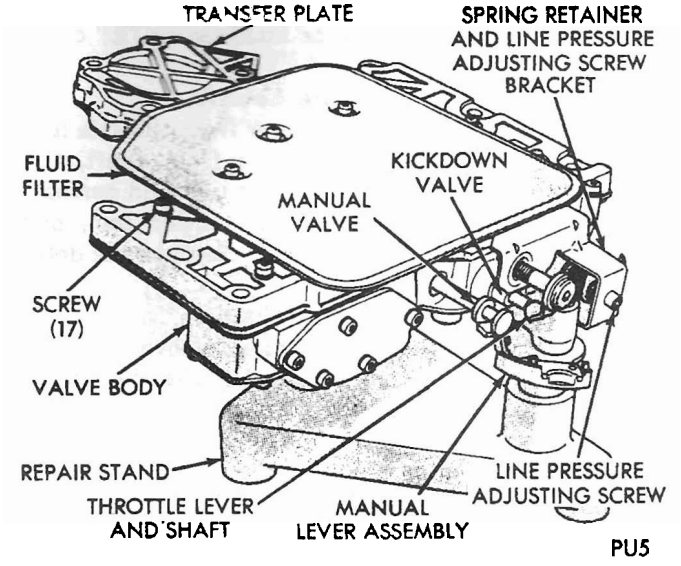



*Fig. 1—Valve Body Assembly*

(2) Drive a new seal into the case with a 15/16 inch socket and hammer (Fig. 13).

This seal can be replaced without removing the valve body from transmission by using a small screwdriver to pry seal out of its bore. Be careful not to scratch manual lever shaft or the seal bore in transmission.

## VALVE BODY DISASSEMBLY

**Tag all springs as they are removed for reassembly identification.**

Do not clamp any portion of valve body or transfer plate in a vise. Any slight distortion of the aluminum body or transfer plate will result in sticking valves, excessive leakage or both. **When removing or installing valves or plugs, slide them in or out carefully. Do not use force.**

Remove "E" clip and park control rod from manual lever.

### *Filter, Transfer Plate, and Pressure Regulators*

(1) Place valve body assembly on repair stand Tool C-3749 (Fig. 1). Remove three screws from the fluid filter and lift off filter.

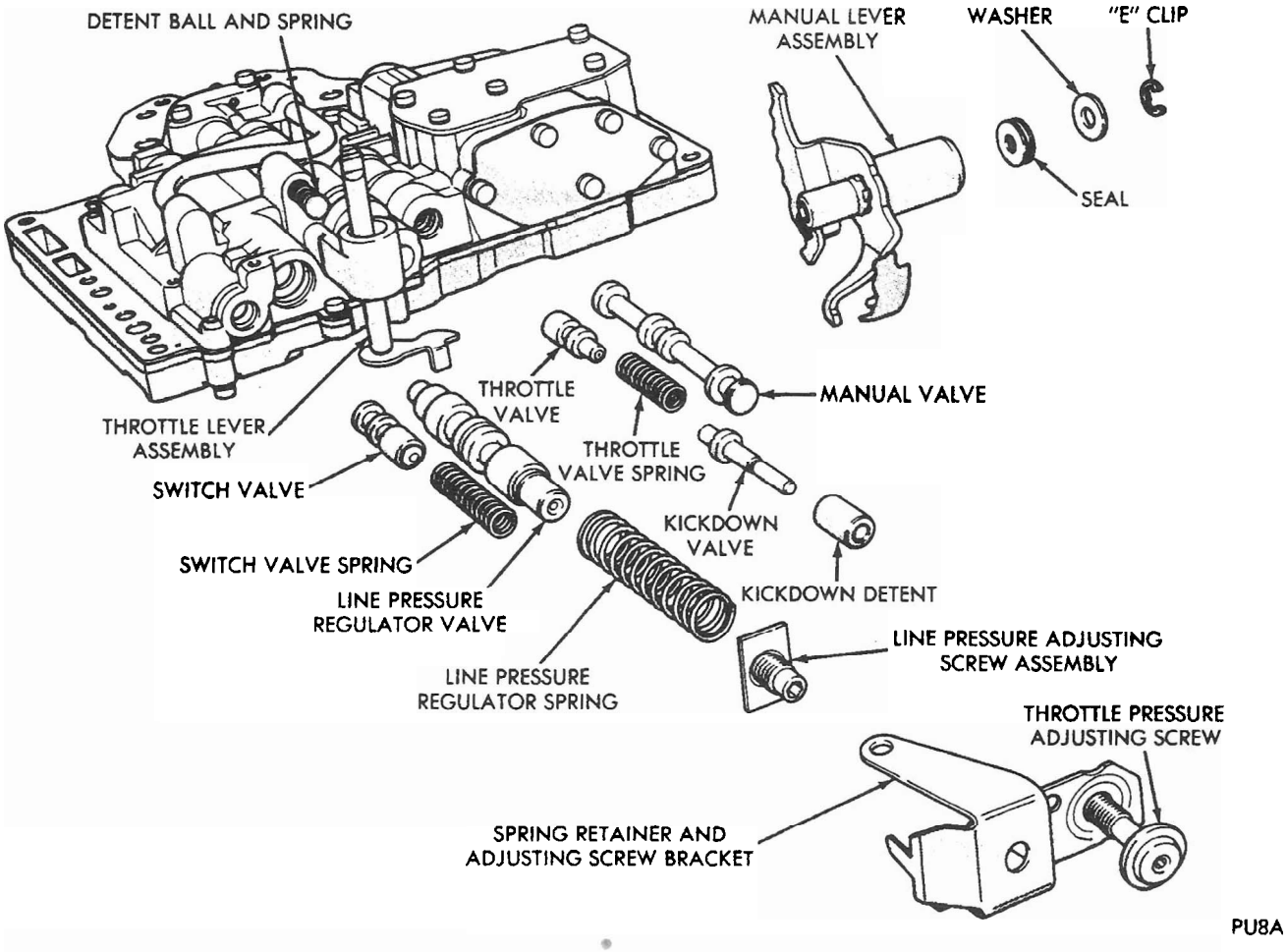



*Fig. 2—Pressure Regulators and Manual Control*

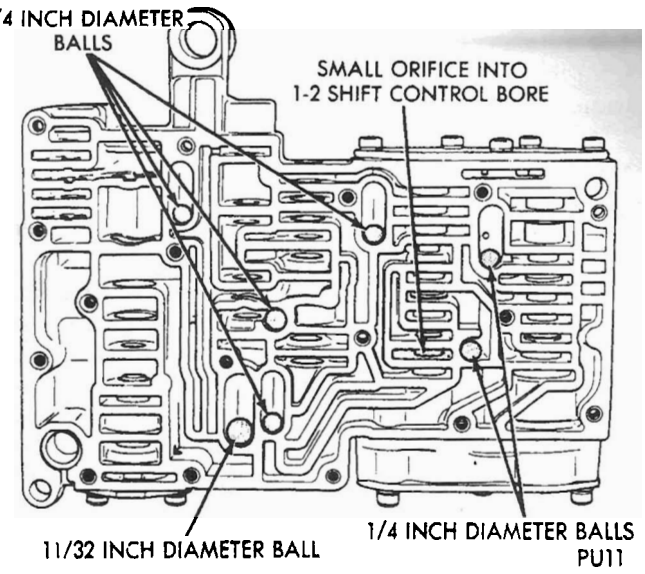



*Fig. 5—Steel Ball Locations*

valve governor plug.

(3) Remove shuttle valve "E" clip and slide shuttle valve out of its bore. [illegible] remove the secondary valve retained by "E" clip.

**Manual Lever and Throttle Lever**

(1) Remove E-ring and washer from throttle lever shaft (Fig. 2). Remove [illegible] from shaft, then while holding manual [illegible] detent ball and spring in their bore with Tool [illegible] or similar tool, slide manual [illegible] shaft. Remove the detent ball and spring.

(2) Slide manual [illegible] bore.

(3) Slide [illegible] kickdown valve, throttle [illegible] throttle valve.

***Shift Valves and Regulator Valve Pressure Sensing Plugs***

(1) Remove the line pressure regulator valve end plate (Fig. 7) and slide out the regulator valve sleeve, line pressure plug, [illegible] and spring.

(2) Remove the end plate and [illegible] housing assembly.

(3) Remove throttle plug from housing.

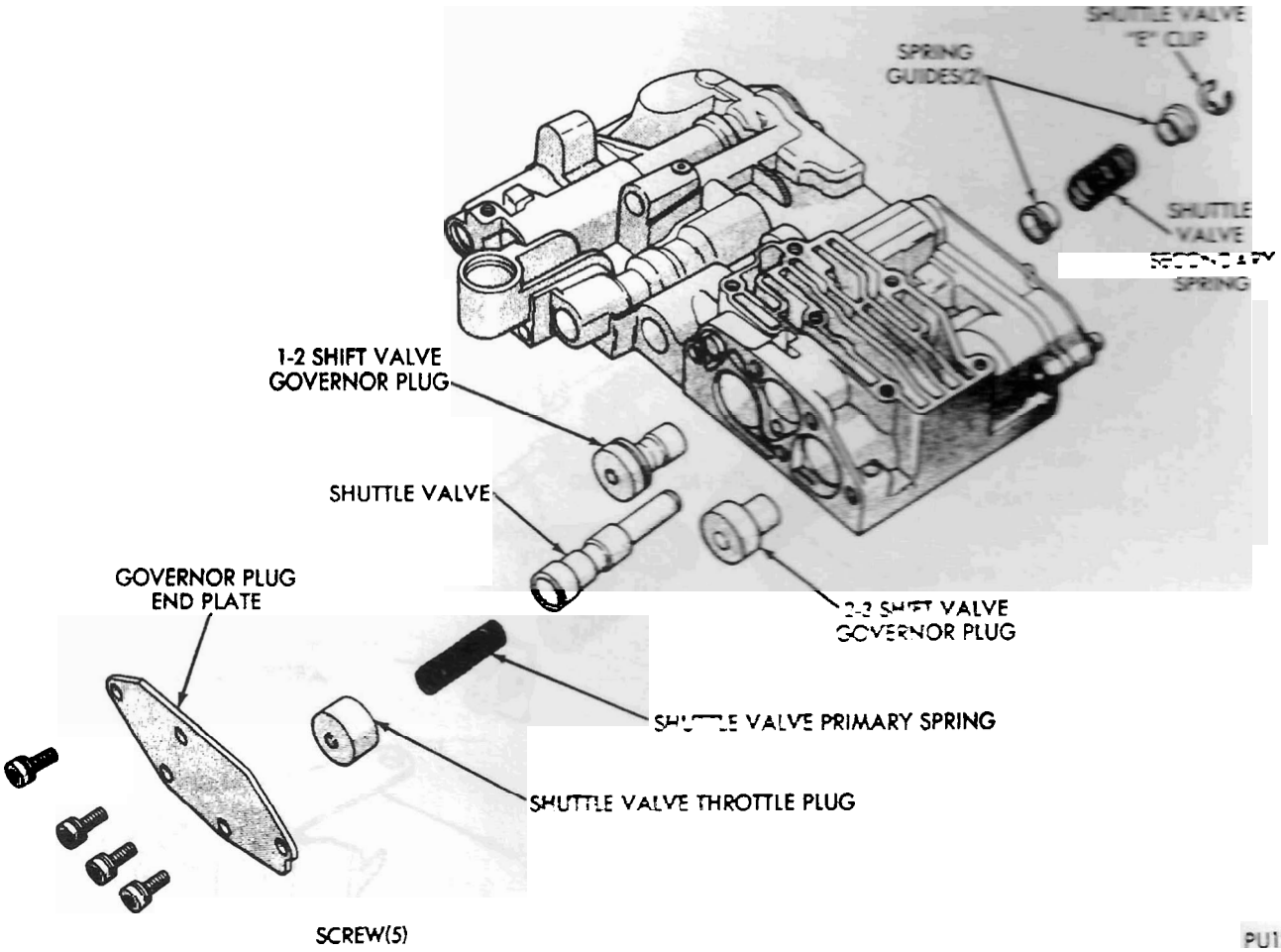



*Fig. 6—Shuttle Valve and Governor Plugs*

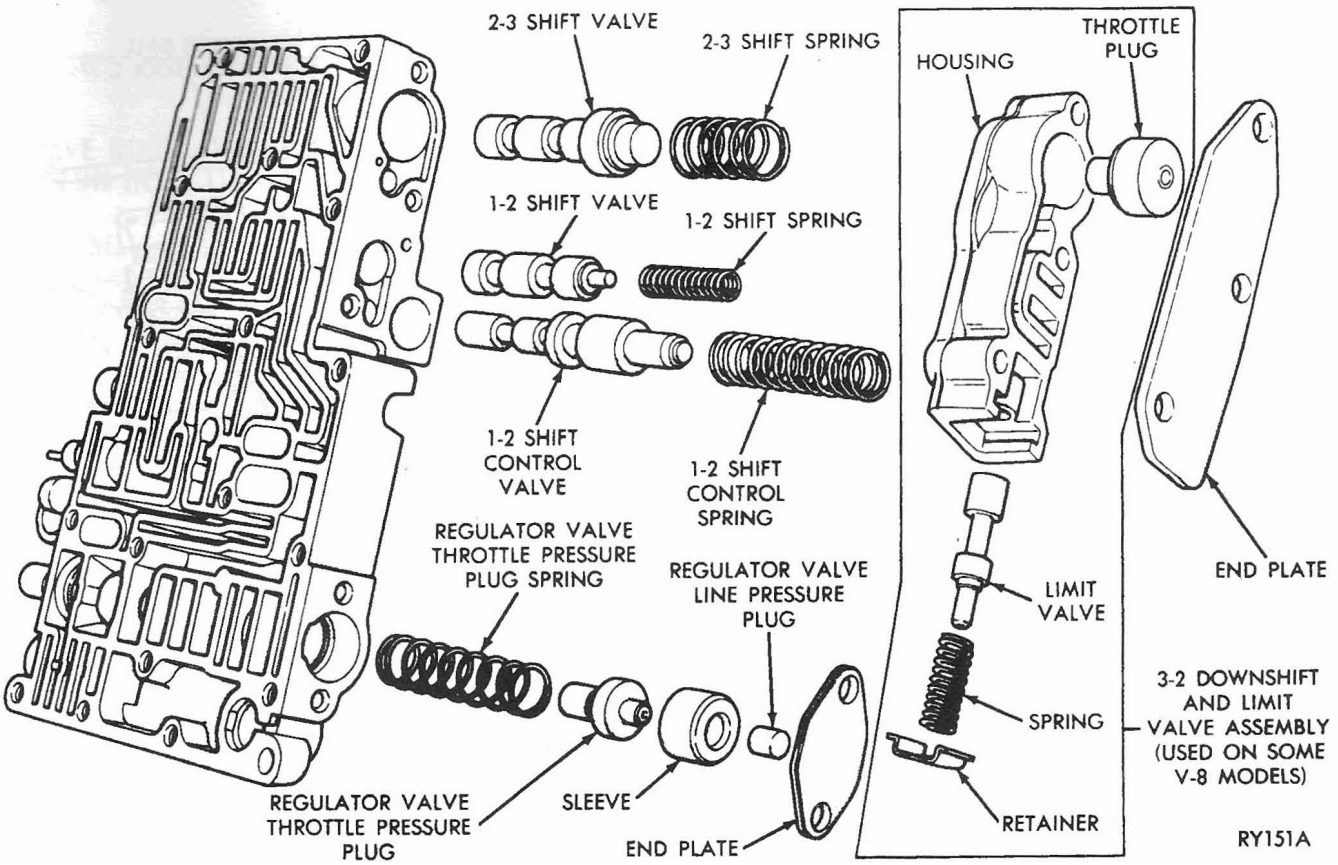



***Fig. 7—Shift Valves and Pressure Regulator Valve Plugs***

(4) Slide retainer from housing and remove limit valve and spring.

(5) Remove the three springs and shift valves from the valve body.

### *Cleaning and Inspection*

Allow all parts to soak a few minutes in a suitable, clean solvent. Wash thoroughly and blow dry with compressed air. Make sure all passages are clean and free from obstructions.

Inspect manual and throttle valve operating levers and shafts for being bent, worn or loose. If a lever is loose on its shaft, the lever and shaft assembly should be replaced. **Do not attempt to straighten bent levers.**

Inspect lock-up solenoid assembly for cut or broken wire, melted or distorted coil, cut or nicked O-rings, etc. Shake solenoid to verify that plunger is free to travel. Replace solenoid if plunger is stuck. Check orifice in solenoid nozzle and drilled crosshole at solenoid bore in transfer plate for dirt or foreign material. To check solenoid operation, hold solenoid with nozzle pointing up and apply 12 volts between solenoid wire and solenoid frame at screw hole. Plunger should travel up and down when 12 volts power is turned on and off.

Inspect all mating surfaces for burrs, nicks and scratches. Minor blemishes may be removed with crocus cloth, using only a very light pressure. Using a straightedge, inspect all mating surfaces for warpage or distortion. Slight distortion may be corrected, using a surface plate. Make sure all metering holes in steel plate and valve body are open. Using a pen light, inspect bores in valve body for scores, scratches, pits and irregularities.

Make sure orifice referred to in (Fig. 5) is open by inserting a 1/32 inch diameter drill through it into the 1-2 shift control valve bore.

Inspect all valve springs for distortion and collapsed coils. Inspect all valves and plugs for burrs, nicks, and scores. Small nicks and scores may be removed with crocus cloth, providing extreme care is taken not to round off sharp edges. The sharpness of these edges is vitally important because it prevents foreign matter from lodging between valve and valve body, thus reducing possibility of sticking. Inspect all valves and plugs for freedom of operation in valve body bores.

When bores, valves, and plugs are clean and dry, the valves and plugs should fall freely in the bores. The valve body bores do not change dimensionally with use. Therefore, a valve body assembly that was functioning properly when vehicle was new, will oper-

ate correctly if it is properly and thoroughly cleaned. There is no need to replace valve body assembly unless it is damaged in handling.

## VALVE BODY REASSEMBLY

**(Tighten all valve body screws to 35 inch-pounds (4 Newton-meters).**

### *Shift Valves and Regulator Valve Pressure Sensing Plugs (Fig. 7)*

(1) Slide shift valves and springs into proper valve body bores.

(2) Subassemble the 3-2 limit valve housing assembly as follows:

(a) Insert limit valve and spring into housing.

(b) Slide spring retainer into groove in housing.

(c) Insert throttle plug in housing bore. Position assembly against the shift valve springs.

**Omit step (2) when no 3-2 limit valve housing assembly is used.**

(3) Install end plate and tighten screws.

(4) Install throttle pressure spring and plug, line pressure plug and sleeve, then fasten end plate to valve body.

### *Shuttle Valve and Governor Plugs (Fig. 6)*

(1) Place 1-2 and 2-3 shift valve governor plugs in their respective bores.

(2) Install shuttle valve and hold it in bore with index finger while installing the secondary spring with guides and retaining "E" clip.

(3) Install primary shuttle valve spring and throttle plug.

(4) Install governor plug end plate and tighten the retaining screws.

(5) Install shuttle valve cover plate and tighten the retaining screws.

### *Manual Lever and Throttle Lever (Fig. 2)*

(1) Install throttle valve, throttle valve spring, kickdown valve, and kickdown detent sleeve.

(2) Slide manual valve into its bore.

(3) Install throttle lever and shaft on valve body. Insert detent spring and ball in its bore in valve body. Depress ball and spring with Tool C-3765 (Fig. 8) or similar tool and slide manual lever over throttle shaft so that it engages manual valve and detent ball. Install seal, retaining washer, and "E" clip on throttle shaft.

### *Filter, Transfer Plate, Lock-up Solenoid, and Pressure Regulators*

(1) Install the 7 balls in valve body as shown in Figure 5.

(2) Install rear clutch ball check and low-reverse-servo ball check (Fig. 4) in transfer plate and regulator valve screen in separator plate (Fig. 4).

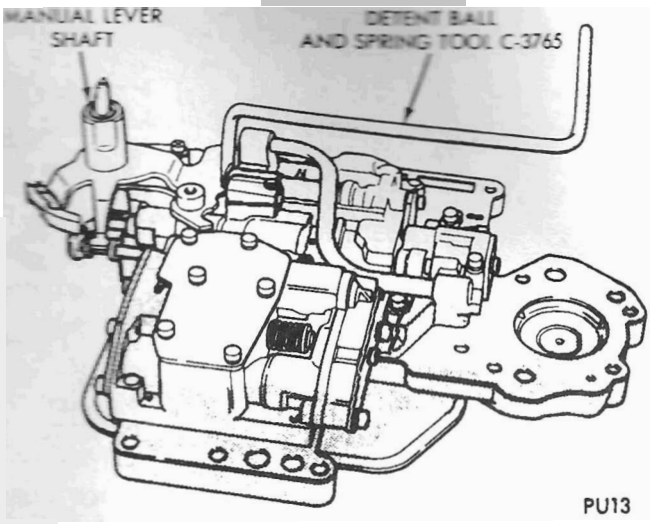



*Fig. 8—Install Detent Spring and Ball*

**The low-reverse servo ball check is used ONLY with A-904T and A-999 transmissions.**

3 Install 3 screws in separator plate.

4 Place transfer plate assembly on valve body. Be careful to align filter screen as the 17 shorter screws are installed finger tight (the three longer screws are for oil filter).

(5) Starting at the center and working outward, tighten screws to 35 in. lbs. (4 N·m).

(6) Slide switch valve and line pressure valves and springs into their bores (Fig. 2).

(7) Install pressure adjusting screw and bracket assembly on the springs and fasten with one screw for now. Use screw which goes into side of valve body. This screw is to be tightened first, after starting the top and bottom screws.

(8) Install oil filter and tighten screws to 35 in. lbs. (4 N·m).

(9) Install lock-up valve and spring, then install fail-safe spring and valve into the lock-up module (Fig. 3). Install lock-up module to transfer and separator plate assembly with three screws. (Install stiffener plate on nonlock-up valve body).

(10) Insert lock-up solenoid nozzle (with O-ring) into bore in transfer plate and install retaining screw. Route lock-up solenoid wire between solenoid and limit valve housing cover, and underneath edge of oil filter. **Correct wire routing is VERY IMPORTANT. The wire must be routed away from the low-reverse band lever.**

(11) After valve body has been serviced and completely assembled, measure throttle and line pressure adjustments (see "Maintenance and Adjustments"). However, if pressures were satisfactory prior to disassembly, use original settings.

(12) Install parking lock rod and "E" clip retainer to manual lever.

## VALVE BODY AND ACCUMULATOR PISTON INSTALLATION

(1) Make sure combination back-up lamp/neutral start switch is not installed in transmission case.

(2) Place valve body manual lever in "manual low" position to move parking rod to rear position.

(3) Use a screwdriver to push the park sprag into engagement with parking gear, turning output shaft to verify engagement. This will allow "knob" on end of parking rod to move past the sprag as valve body is installed.

(4) Install accumulator piston in the transmission case.

(5) Position accumulator spring between piston and valve body.

(6) Place valve body in position, working park rod through opening and past sprag. Install retaining bolts finger tight.

(7) With neutral starting switch installed, place manual lever in the "neutral" position. Shift valve body if necessary, to center neutral finger over the neutral switch plunger. Snug bolts down evenly, then tighten to 105 in. lbs. (12 N·m).

(8) Connect lock-up solenoid wire to wiring connector pin at rear of transmission case, if so equipped.

(9) Install gearshift lever and tighten clamp bolt. Check lever shaft for binding in the case by moving lever through all detent positions. If binding exists, loosen valve body bolts and realign.

(10) Make sure throttle shaft seal is in place, then install flat washer and throttle lever and tighten the clamp bolt. Connect throttle and gearshift linkage and adjust as required.

(11) Install oil pan, with a new gasket. Add transmission fluid to bring it up to proper level.

## ALUMINUM THREAD REPAIR

Damaged or worn threads in the aluminum transmission case and valve body can be repaired by the use of Heli-Coils, or equivalent. Essentially, this repair consists of drilling out the worn or damaged threads, tapping the hole with a special Heli-Coil tap, or equivalent, and installing a Heli-Coil insert, or equivalent into the tapped hole. This brings the hole back to its original thread size.

Heli-Coil, or equivalent, tools and inserts are readily available from most automotive parts suppliers.

# SERVICE OUT OF VEHICLE

## TRANSMISSION AND CONVERTER REMOVAL

Remove Transfer Case (if so equipped). Refer to "Transfer Case Removal" for procedure.

(1) The transmission and torque converter must be removed as an assembly; otherwise, the torque converter drive plate, pump bushing, or oil seal may be damaged. The drive plate will not support a load; therefore, none of the weight of the transmission should be allowed to rest on the plate during removal.

(2) Disconnect negative (ground) cable from the battery for safety.

(3) Some models require that the exhaust system be dropped for clearance, (see Group 11).

(4) Remove engine to transmission struts, if so equipped.

(5) Remove cooler lines at Transmission.

(6) Remove starter motor and cooler line bracket.

(7) Remove torque converter access cover.

(8) Loosen oil pan bolts, tap the pan to break it loose allowing fluid to drain.

(9) Reinstall pan.

(10) Mark torque converter and drive plate to aid in reassembly. The crankshaft flange bolt circle, inner and outer circle of holes in the drive plate, and the four tapped holes in front face of the torque converter all have one hole offset so these parts will be installed in the original position. This maintains balance of the engine and torque converter.

(11) Rotate engine clockwise with socket wrench on vibration dampener bolt to position the bolts attaching torque converter to drive plate, and remove bolts.

(12) Mark parts for reassembly then disconnect propeller shaft at rear universal joint. Carefully pull shaft assembly out of the extension housing.

(13) Disconnect wire connector from the back-up lamp and neutral starting switch and lock-up solenoid wiring connector, if so equipped.

(14) Disconnect gearshift rod and torque shaft assembly from transmission.

**When it is necessary to disassemble linkage rods from levers that use plastic grommets as retainers, the grommets should be replaced with new ones.** Use a prying tool to force rod from grommet in lever, then cut away old grommet. Use pliers to snap new grommet into lever and rod into grommet.

(15) Disconnect throttle rod from lever at the left side of transmission. Remove linkage bellcrank from transmission, if so equipped.

(16) Remove oil filler tube and speedometer cable.

(17) Install engine support fixture, Tool C-3487-A with frame hooks or a suitable substitute, that will support rear of the engine (Fig. 1).

(18) Raise transmission slightly with service jack to relieve load on the supports.

(19) Remove bolts securing transmission mount to crossmember and crossmember to frame, then remove crossmember.

(20) Remove all bell housing bolts.

(21) Carefully work transmission and torque converter assembly rearward off engine block dowels and disengage torque converter hub from end of crankshaft. **Attach a small "C" clamp to edge of bell housing to hold torque converter in place during transmission removal.**

(22) Lower transmission and remove assembly from under the vehicle.

(23) To remove torque converter assembly; remove "C" clamp from edge of bell housing, then carefully slide assembly out of the transmission.

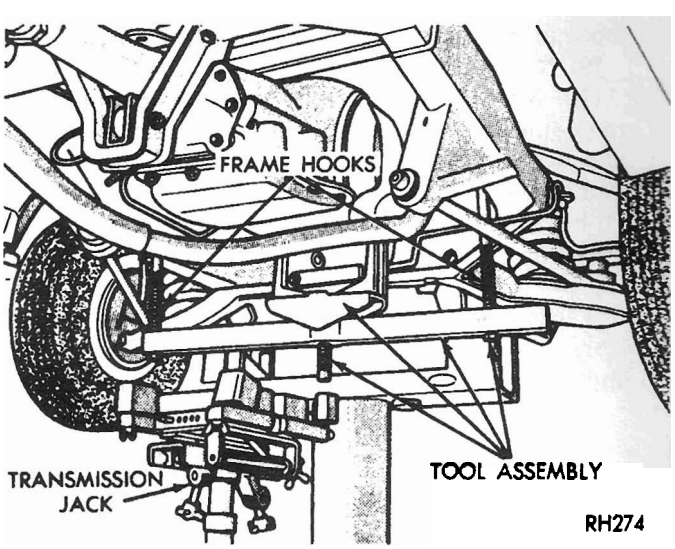



*Fig. 1—Engine Support Fixture (Typical)*

## STARTER RING GEAR REPLACEMENT

NOTE 1: A [illegible] converters, with starter ring gears that require replacement, **should be replaced** with a [illegible] assembly. This is to prevent [illegible] damage while welding new ring gear in place.

NOTE 2: A [illegible] converters, with starter ring gears that require replacement can have the gear changed as per instructions below.

The starter ring gear is mounted directly on outer diameter of the torque converter front cover. With torque converter removed from vehicle, replacement of the gear is as follows:

### *Removal*

(1) Cut through weld material at rear side of ring gear with a hack saw or grinding wheel (Fig. 2). Be careful not to cut or grind into front cover stamping.

(2) Scribe a heavy line on the front cover next to front face of ring gear to aid in locating the new gear.

(3) Support torque converter on front cover, next to the lugs with blocks of wood to prevent altering lug position. The torque converter must **not** rest on the front cover hub during this operation. Using a blunt chisel, or drift and hammer, tap downward on ring gear near welded areas to break any remaining weld material (Fig. 2). Tap around ring gear until it comes off the torque converter.

(4) Smooth off weld areas on the cover with a file.

### *Installation*

Any of the following methods may be used to heat and expand starter ring gear for installation on the torque converter:

**Oven:** Place ring gear in Oven and set temperature at 200 degrees F. (93 degrees Celsius). Allow ring gear

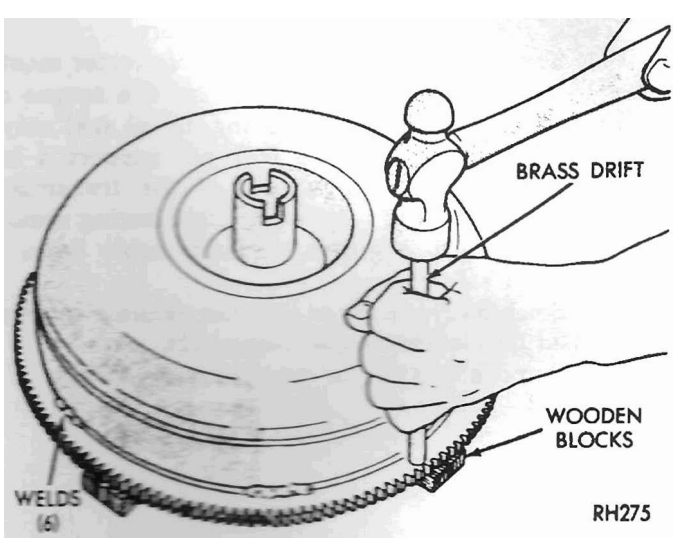



*Fig. 2—Remove Starter Ring Gear (For Lock-Up Only)*

to remain in oven for 15 to 20 minutes.

**Boiling Water:** Place ring gear in a shallow container, add water, and heat for approximately eight minutes after water has come to a boil.

**Steam:** Place ring gear on a flat surface and direct flow around gear for approximately two minutes.

**Flame:** Place ring gear squarely on a flat surface. Using a medium-size tip, direct a slow flame evenly around inner rim of the gear. **Do not apply flame to the gear teeth.** Place a few drops of water on face of gear at intervals during heating process. When gear is hot enough to just boil the water, installation of gear on the torque converter can be made.

(1) After ring gear is expanded by heating, place the gear in position on torque converter front cover. Tap gear on the cover evenly with a plastic or rawhide mallet until face of gear is even with scribed line (made during removal) on the front cover. Make sure gear is even with scribed line around full circumference of the front cover.

(2) Reweld ring gear to torque converter front cover, being careful to place, as nearly as possible, same amount of weld material in exactly same location as was used in original weld. This is necessary in order to maintain proper balance of the unit. Place welds alternately on opposite sides of torque converter to minimize distortion.

(3) The following suggestions are offered as an aid in making the weld:

a. **Do not gas weld.**

b. Use a D.C. welder that is set at straight polarity or an A.C. welder if the proper electrode is available.

c. Use a 1/8 inch diameter welding rod, and a welding current of 80 to 125 amps.

d. Direct the arc at intersection of the gear and front cover from an angle of 45 degrees from rear face of the gear.

(4) Inspect gear teeth and remove all nicks where metal is raised, weld metal splatter, etc., in order to insure quiet starter operation.

## OIL COOLER AND TUBES FLUSHING
**(See "Diagnosis and Tests")**

## PUMP OIL SEAL

### *Replacement*

The pump oil seal can be replaced without removing pump and reaction shaft support assembly from the transmission case.

(1) **A-904T and A-999:** Screw seal remover Tool C-3981 into seal (Fig. 3), then tighten screw portion of tool to withdraw the seal.

**A-727:** Using Tool C-3861, remove seal in the same manner.

(2) **A-904T and A-999:** To install a new seal, place seal in opening of the pump housing (lip side facing inward). Using Tool C-4193 and handle Tool C-4171, drive seal into housing until tool bottoms (Fig. 4).

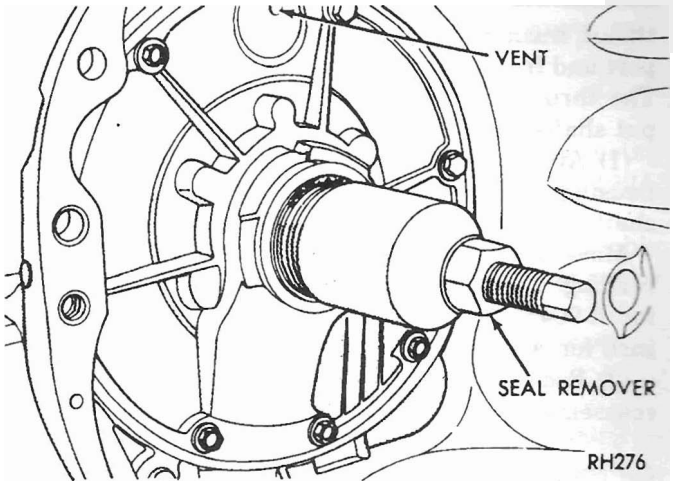



*Fig. 3—Remove Pump Seal*

**A-727:** Using Tool C-3860-A and handle Tool C-4171, install new seal in the same manner.

## DISASSEMBLY—SUBASSEMBLY REMOVAL

Prior to removing any transmission subassemblies, plug all openings and thoroughly clean exterior of the unit, preferably by steam. Cleanliness through entire disassembly and assembly cannot be overemphasized. When disassembling, each part should be washed in a suitable solvent, then dried by compressed air. **Do not wipe parts with shop towels.** All mating surfaces in the transmission are accurately machined; therefore, careful handling of parts must be exercised to avoid nicks or burrs.

### *Input Shaft End Play*

Measuring input shaft end play before disassembly will usually indicate when a thrust washer change is required, (except when major parts are replaced). The

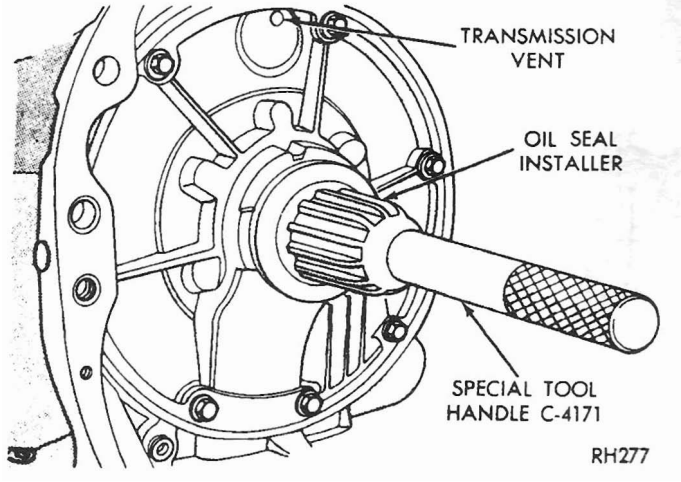



*Fig. 4—Install Pump Seal*

thrust washer is located between reaction shaft support and front clutch retainer on A-727 transmissions. The thrust washer is located between input and output shafts on A-904T and A-999 transmissions.

(1) Attach a dial indicator to transmission bell housing with its plunger seated against end of input shaft (Fig. 5).

Move input shaft in and out to obtain end play reading. End play specifications are .022 to .091 inch for A-904T and A-999 transmission, and .034 to .084 inch for A-727 transmissions.

(2) Record indicator reading for reference when reassembling the transmission.

### Oil Pan

(1) Place transmission assembly in repair stand. Tool C-3750-A (Fig. 6).

(2) Remove oil pan bolts and remove oil pan and gasket.

### Valve Body Assembly

(1) Loosen clamp bolts and remove throttle and gearshift levers from the transmission.

(2) Remove back-up lamp/neutral start switch.

(3) Disconnect lock-up solenoid wire from wiring connector at rear of transmission case, if so equipped.

(4) Remove the 10 hex-head valve body to transmission bolts. Remove "E" clip securing parking lock rod to the valve body manual lever.

(5) While lifting valve body upward out of transmission case, disconnect parking lock rod from the lever.

### Accumulator Piston and Spring

(1) Lift spring off accumulator piston and withdraw piston from the case.

### Extension Housing (or Adapter on 4-W-D)

Before removing extension housing, pull parking lock rod forward out of the case. Rotate output shaft,

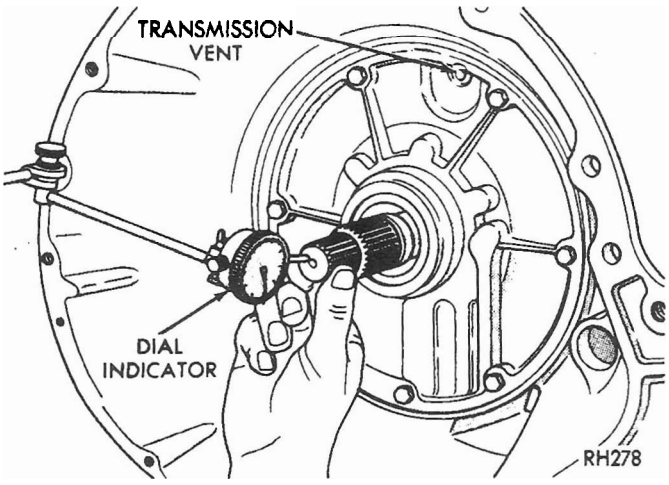



*Fig. 5—Measuring Input Shaft End Play*

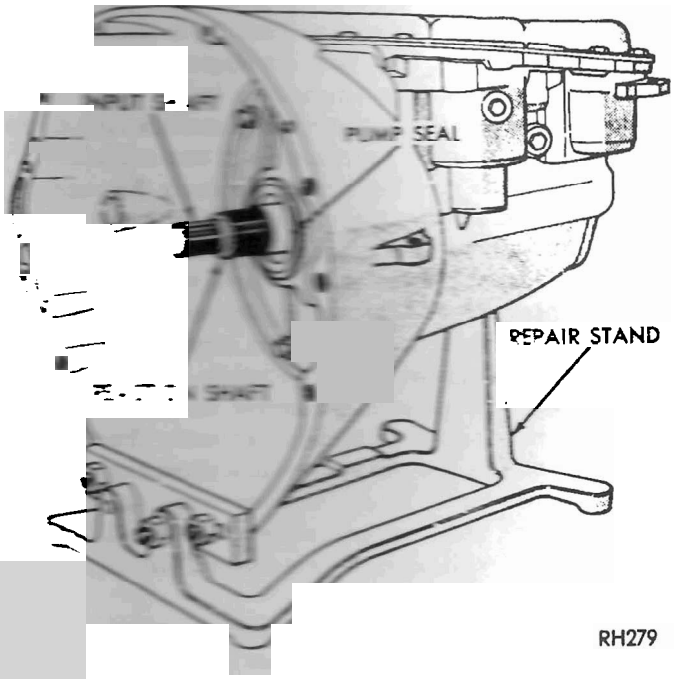



*Fig. 6—Transmission in Repair Stand*

align parking gear and sprag to permit [illegible] to pass the sprag.

speedometer pinion and adapter [illegible].

Remove bolts securing extension housing to transmission bolts.

Remove screws retaining and gasket from bottom of extension housing rear bushing pad. Spread large snap ring from output shaft bearing. With snap ring spread as far as possible, carefully tap extension housing off the output shaft and bearing.

(4) Using heavy-duty snap ring pliers, remove output shaft bearing rear snap ring. Remove bearing from shaft, then remove front snap ring (A-727). The A-904T and A-999 transmissions have no front snap ring.

(5) On 4-W-D vehicles, use Tool L-4450 inverted with Handle C-4171 to drive out bearing from adapter, if necessary.

### Governor and Support

(1) Carefully pry snap ring from weight end of governor valve shaft. Slide valve and shaft assembly out of the governor body.

(2) Remove snap ring from behind governor body, then slide governor body and support assembly off the output shaft.

### Oil Pump and Reaction Shaft Support

(1) Tighten front band adjusting screw until band is tight on front clutch retainer. This prevents clutch retainer from coming out with pump which might cause unnecessary damage to the clutches.

(2) Remove oil pump housing retaining bolts.

(3) Attach Tool C-3752 to pump housing flange, (Fig. 7), in threaded holes in the flange.

(4) Bump outward evenly with the two "knocker weights" to withdraw oil pump and reaction shaft support assembly from the case.

***Front Band and Front Clutch***

(1) Loosen front band adjuster, remove band strut (and A-727 anchor) and slide band out of the case.

(2) Slide front clutch assembly out of the case.

***Input Shaft and Rear Clutch***

(1) Grasp input shaft, and slide input shaft and rear clutch assembly out of the case.

Be careful not to lose thrust washer located between rear end of input shaft and forward end of the output shaft.

***Planetary Gear Assemblies, sun Gear, and Driving Shell***

(1) While supporting output shaft and driving shell, carefully slide assembly forward and out through the case.

Be very careful not to damage ground surfaces on output shaft during removal.

***Rear Band and Low-Reverse Drum***

(1) Remove low-reverse drum, loosen rear band adjuster, remove band strut and link, remove band from the case.

**(Double-Wrap Band):** Loosen band adjusting screw, then remove band and low-reverse drum.

***Overrunning Clutch***

(1) Note position of overrunning clutch rollers and springs before disassembly, to assist in reassembly.

(2) Carefully slide out clutch hub and remove rollers and springs.

***Kickdown Servo (Front)***

(1) Compress kickdown servo spring by using engine valve spring compressor Tool C-3422A, remove snap ring (Fig. 8).

(2) Remove rod guide, spring and piston assembly from the case. Be careful not to damage piston rod or guide during removal.

(3) Withdraw piston from the transmission case.

***Low-Reverse Servo (Rear)***

(1) Compress low and reverse servo piston spring by using engine valve spring compressor Tool C-3422A, then remove the snap ring.

(2) Remove spring retainer, spring, and servo piston and plug assembly from the case.

## RECONDITION SUBASSEMBLIES

The following procedures cover disassembly, inspection, repair, and assembly of each subassembly as removed from the transmission.

Heli-Coil inserts are recommended for repairing damaged, stripped or worn threads in aluminum parts.

Presized service bushings are available for replacement for most all bushings in the LoadFlite transmissions. The two bushings in sun gear are not serviced because of the low cost of sun gear assembly. If bushings are found worn or scored, they should be replaced as outlined in the following reconditioning procedures.

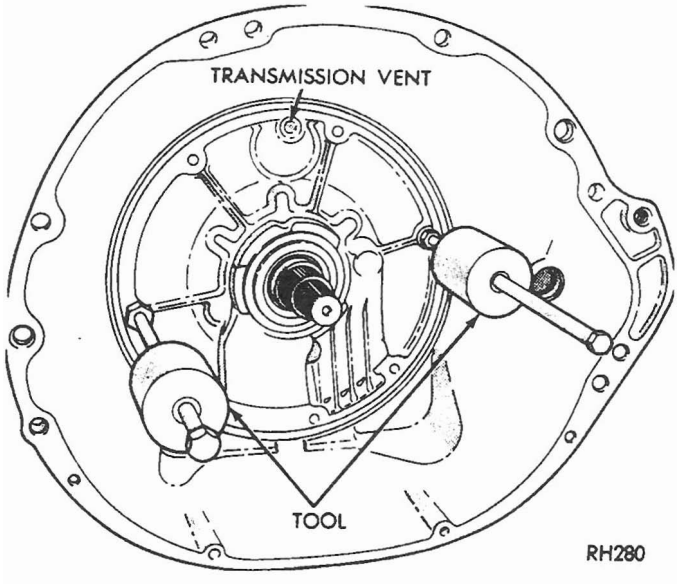



*Fig. 7—Remove Oil Pump*

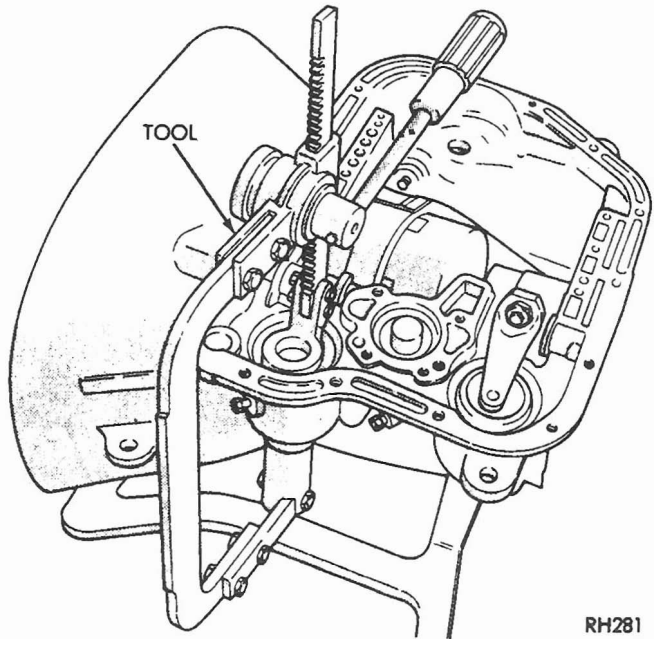



*Fig. 8—Compress Kickdown Servo Spring*

The bushing replacement tools listed by "SP" numbers are part of Tool Kit C-3887B.

The use of crocus cloth is permissible where necessary, providing it is used carefully. When used on valves, use extreme care to avoid rounding off the sharp edges. The sharp edge is vitally important to this type of valve. Sharp edges prevent dirt and foreign matter from getting between the valve and body, thus reducing possibility of sticking. When it becomes necessary to recondition transmission, and vehicle has accumulated considerable mileage, install new seal rings on parts requiring their usage. Coat each part with automatic transmission fluid during assembly.

## OIL PUMP AND REACTION SHAFT SUPPORT—A-904T and A-999

**Due to the lock-up torque converter, it is important that the oil pump be within the clearance limits as specified. Also note that the oil pump bushing should be replaced in any overhaul.**

### *Disassembly*

Figure 9 shows the oil pump and reaction shaft support disassembled.

(1) Remove bolts from rear side of reaction shaft support and lift support off the pump.

(2) Remove rubber seal ring from pump body flange.

(3) Drive out oil seal with a blunt punch.

### *Inspection*

Inspect interlocking seal rings (Fig. 9) on reaction shaft support for wear or broken locks, make sure they turn freely in the grooves. Seal rings have to be removed to allow clearance for #1 thrust washer removal or installation. Inspect front clutch piston retainer to reaction shaft support thrust washer for wear. Washer thickness should be .061 to .063 inch, replace if necessary. Inspect machined surfaces on pump body and reaction shaft support for nicks and burrs. Inspect pump body and reaction shaft support bushings for wear or scores. Inspect pump gears for scoring or pitting. With gears cleaned and installed in pump body, place a straightedge across face of gears and pump body. Use a feeler gauge to measure clearance between straightedge and face of gears. Clearance limits are from .001 to .0025 inch. Also, measure gear tip clearance between inner and outer gear teeth. Clearance limits are from .0045 to .0095 inch. Clearance between outer gear and its bore in oil pump body should be .0035 to .0075 inch.

### *Pump Bushing Replacement—A-904T and A-999*

(1) Place pump housing (seal face down) on a smooth firm surface.

(2) Place removing head, Tool SP-3551 in bushing and install handle Tool C-4171 in the removing head (Fig. 10).

(3) Drive bushing straight down and out of pump housing bore. Be careful not to cock tool in the bore.

(4) Position new bushing on installing head Tool SP-5117.

(5) With pump housing on a smooth, clean surface, start bushing and installing head in the bushing bore. Install handle in the installing head (Fig. 10).

(6) Drive bushing into housing until tool bottoms in the pump cavity. Be careful not to cock tool during installation.

(7) Stake bushing in place by using a blunt punch or similar tool (Fig. 11). A gentle tap at each stake slot location will suffice.

(8) Using a narrow-bladed knife or similar tool, remove high points or burrs around staked area (Fig. 11). Do not use a file or similar tool that will remove more metal than is necessary.

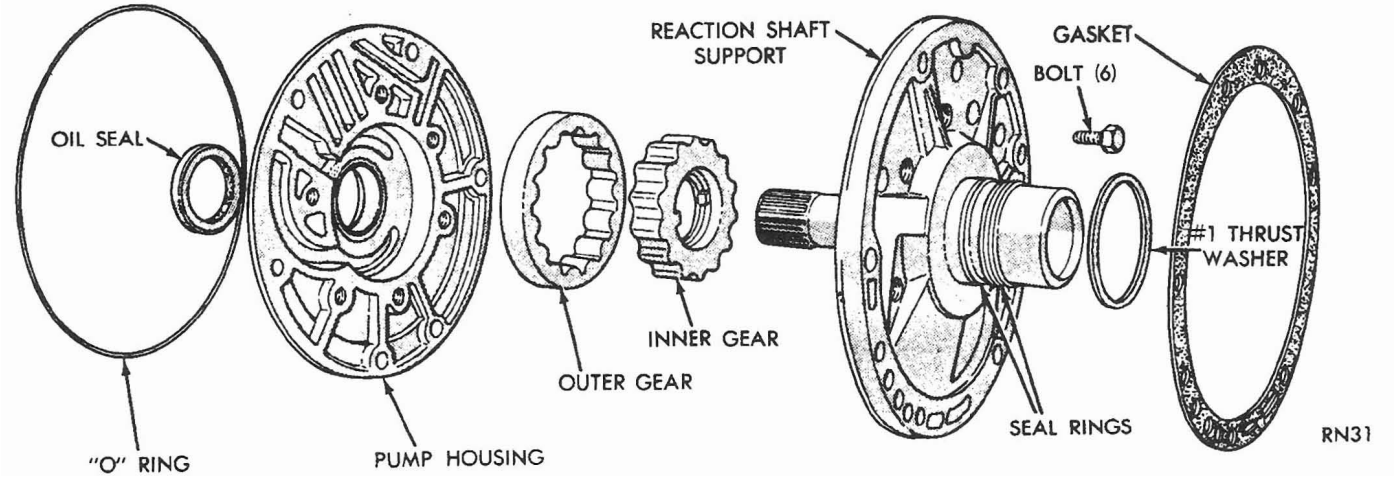



*Fig. 9—Oil Pump and Reaction Shaft Support (A-904T and A-999)*

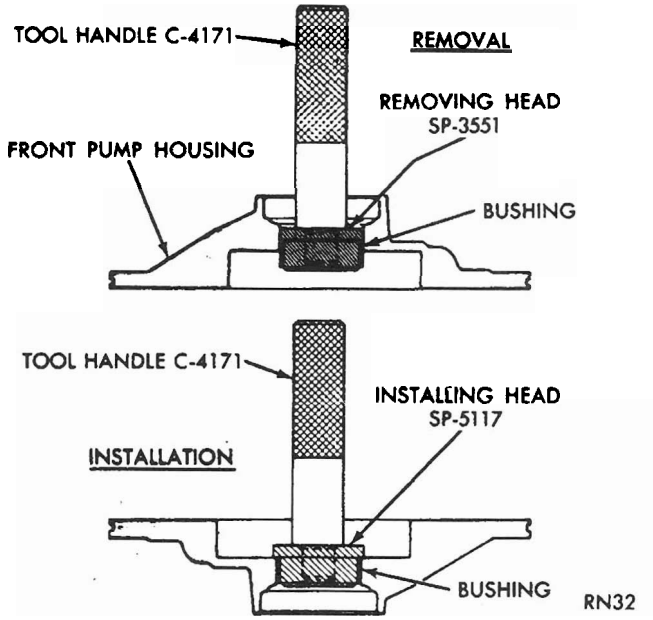



*Fig. 10—Replace Pump Bushing (A-904T and A-999)*

### Reaction Shaft Bushing Replacement—A-904T and A-999

For identification purposes, **lock-up** reaction shaft support has **3 steel balls** in the support at outside diameter of reaction shaft and **nonlock-up** has **2 steel balls.**

In case of a reacton shaft bushing failure, always inspect the support for wear from the input shaft seal ring lands. If worn or grooved, replace support assembly.

(1) Assemble the remover Tool SP-5324, cup Tool SP-3633, and hex-nut Tool SP-1191 (Fig. 12).

Do not clamp any part of reaction shaft or support in a vise.

(2) With cup held firmly against reaction shaft, thread remover into bushing as far as possible by hand.

(3) Using a wrench, screw remover into bushing 3 to 4 additional turns to firmly engage threads in the bushing.

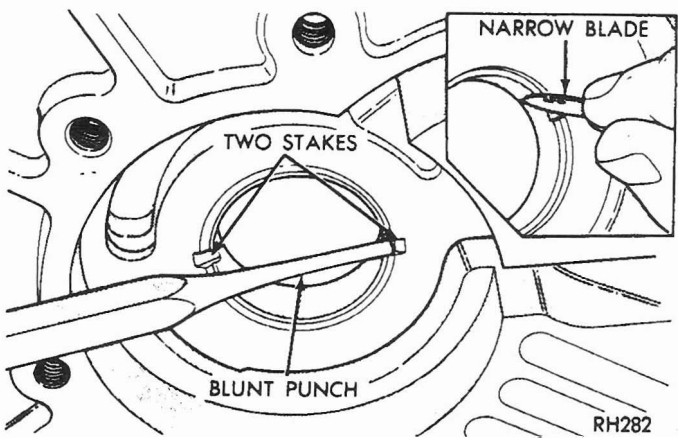



*Fig. 11—Stake Pump Bushing (A-904T and A-999)*

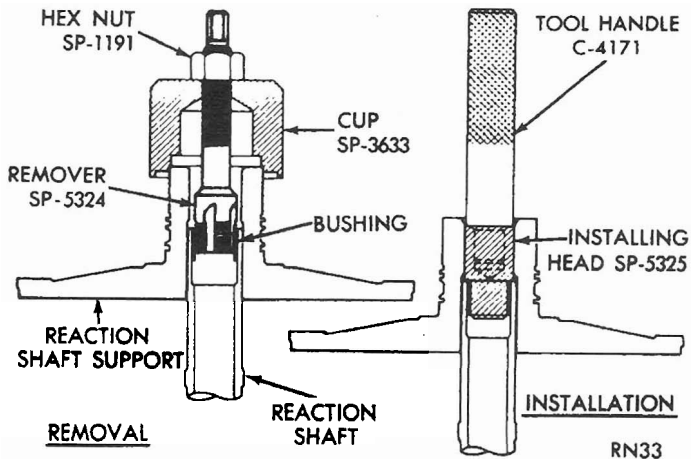



*Fig. 12—Replacing Reaction Shaft Bushing (A-904T and A-999)*

(4) Turn hex nut down against cup to pull bushing from reaction shaft. Thoroughly clean reaction shaft to remove chips made by remover threads.

(5) Lightly grip bushing in a vise or with pliers and back tool out of the bushing. Be careful not to damage threads on bushing remover.

(6) Slide a new bushing on installing head Tool SP-5325, and start them in the bore of reaction shaft (Fig. 12).

(7) Support reaction shaft upright on a clean, smooth surface and install handle C-4171 in installing head. Drive bushing into the shaft until tool bottoms.

(8) Thoroughly clean reaction shaft support assembly before installation.

### Assembly

(1) Place reaction shaft support in assembling Tool C-3759, with hub of support and tool resting on a smooth, flat surface bench (Fig. 13). Screw two pilot studs Tool C-3283A into threaded holes of reaction shaft support flange.

(2) Assemble and place pump gears in center of the support.

(3) Lower pump body over the pilot studs, insert Tool C-3756 through pump body and engage pump inner gear. Rotate the pump gears with tool to center gears in pump body, then with pump body firm against reaction shaft support, tighten clamping tool securely.

(4) Invert pump and reaction shaft support assembly with clamping tool intact. Install support to pump body bolts and tighten to 175 in. lbs. (20 N·m). Remove clamping tool, pilot studs, and gear alignment tool.

(5) Place a new oil seal in opening of pump housing (lip of seal facing inward). Using Tool C-4193 and handle Tool C-4171, drive seal into housing until tool bottoms.

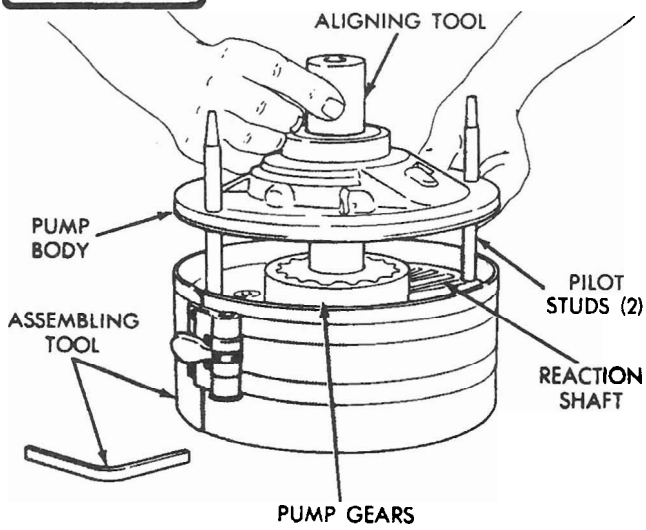



*Fig. 13—Assemble Pump and Reaction Shaft Support (A-904T and A-999)*

## OIL PUMP AND REACTION SHAFT SUPPORT—A-727

**It is important that the oil pump be within the clearance limits as specified. Also note that the oil pump bushing should be replaced in any overhaul.**

### *Disassembly*

Figure 14 shows the oil pump and reaction shaft support disassembled.

(1) Remove bolts from rear side of reaction shaft support, and lift support off the pump.

(2) Remove rubber seal ring from pump body flange.

(3) Drive out oil seal with a blunt punch.

### *Inspection*

Inspect interlocking seal rings (Fig. 14) on reaction shaft support for wear or broken locks, make sure they turn freely in the grooves. Inspect machined surfaces on pump body and reaction shaft support for nicks and burrs. Inspect pump body and reaction shaft support bushings for wear or scores. Inspect pump gears for scoring or pitting. With gears cleaned and installed in pump body, place a straightedge across face of gears and pump body. Use a feeler gauge to measure clearance between straightedge and face of gears. Clearance limits are from .001 to .0025 inch. Also, measure gear tip clearance between inner and outer teeth. Clearance limits are from .005 to .010 inch. Clearance between outer gear and its bore in oil pump body should be .004 to .008 inch.

### *Pump Bushing Replacement—A-727*

(1) Place pump housing on a clean, smooth surface

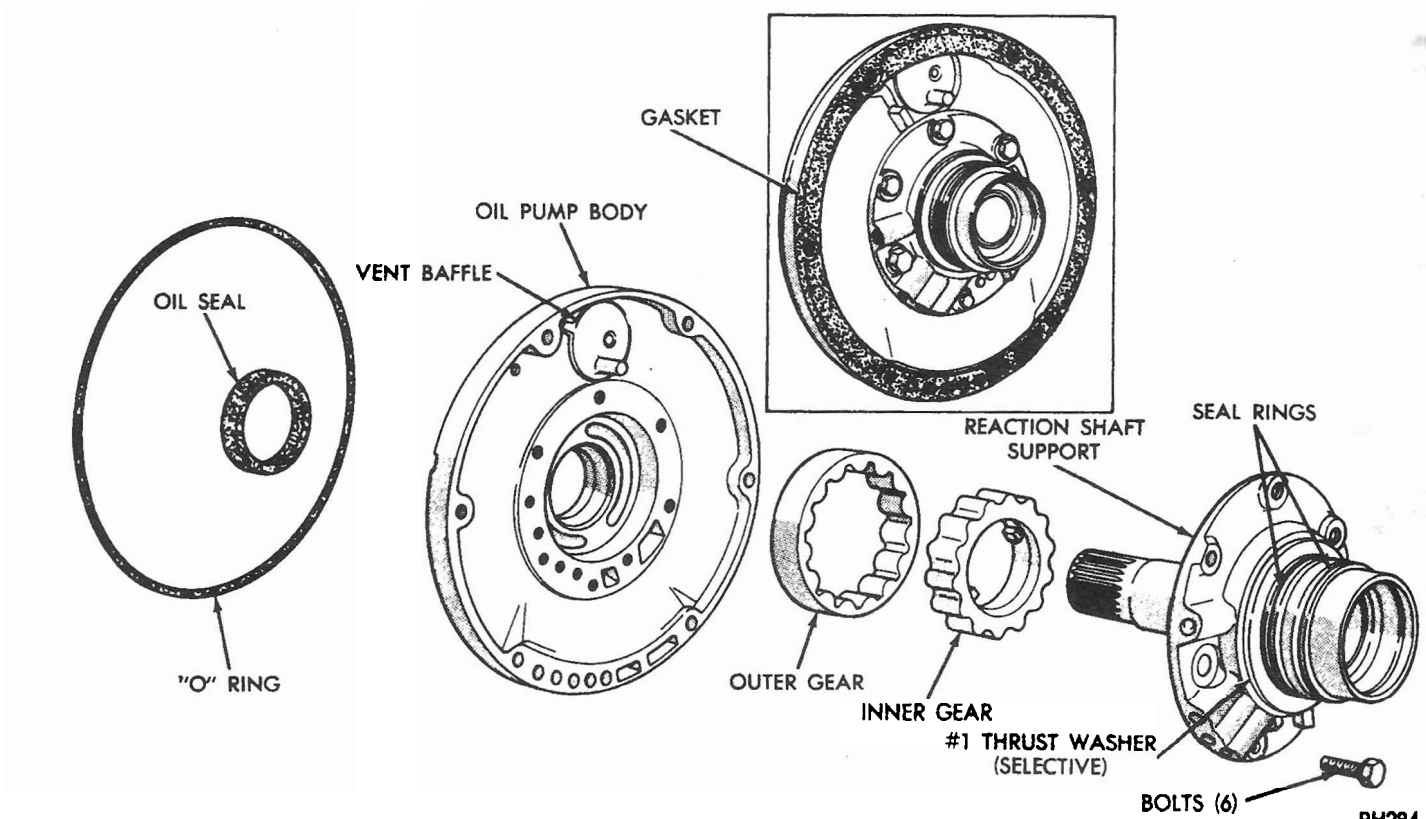



*Fig. 14—Oil Pump and Reaction Shaft Support (A-727)*

...gear cavity down.

2) Place removing head Tool SP-3550 in bushing, and install handle Tool C-4171 in the removing head (Fig. 15).

3) Drive bushing straight down and out of the bore. Be careful not to cock tool in the bore.

4) Position a new bushing on installing head Tool SP-5118.

5) With pump housing on a smooth, clean surface (hub end down), start bushing and installing head in the bushing bore. Install handle in installing head.

6) Drive bushing into housing until tool bottoms in the pump cavity. Be careful not to cock tool during installation.

7) Stake the bushing in place by using a blunt punch or similar tool (Fig. 16). A gentle tap at each stake slot location will suffice.

8) Using a narrow-bladed knife or similar tool, remove high points or burrs around staked area. Do not use a file or similar tool that will remove more metal than is necessary.

9) Thoroughly clean pump housing before installation.

### Reaction Shaft Bushing Replacement—A-727

1) Assemble the remover Tool SP-5301, cup Tool SP-3633, and hex-nut Tool SP-1191 (Fig. 17).

Do not clamp any part of reaction shaft or support in a vise.

(2) With cup held firmly against reaction shaft, thread remover into bushing as far as possible by hand.

3) Use a wrench to screw remover into bushing 3 to 4 additional turns to firmly engage threads in the bushing.

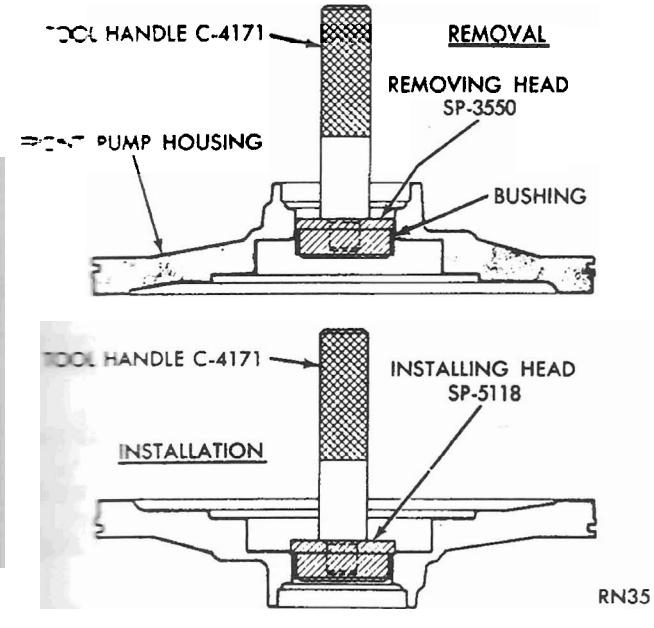



*Fig. 15—Replacing Pump Bushing (A-727)*

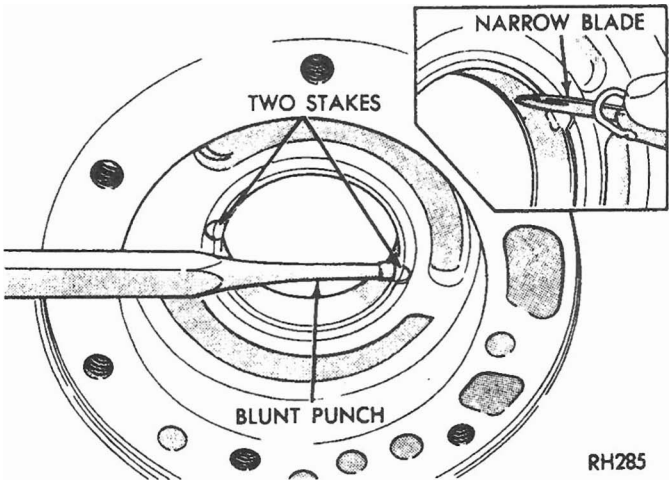



*Fig. 16—Stake Pump Bushing (A-727)*

(4) Turn hex nut down against the cup to pull bushing from reaction shaft. Thoroughly clean reaction shaft to remove chips made by remover threads.

(5) Lightly grip bushing in a vise or with pliers and back tool out of the bushing. Be careful not to damage threads on bushing remover.

(6) Slide a new bushing (chamfered end first) on installing head Tool SP-5302, and start them in the bore of reaction shaft (Fig. 17).

(7) Support reaction shaft upright on a clean, smooth surface and install handle Tool C-4171 in installing head. Drive bushing into shaft until tool bottoms.

(8) Thoroughly clean the reaction shaft support assembly before installation.

### Assembly

(1) Assemble pump gears and "O" ring in the pump housing (Fig. 14).

(2) Install reaction shaft support. Install retaining bolts and tighten to 175 in. lbs. (20 N·m).

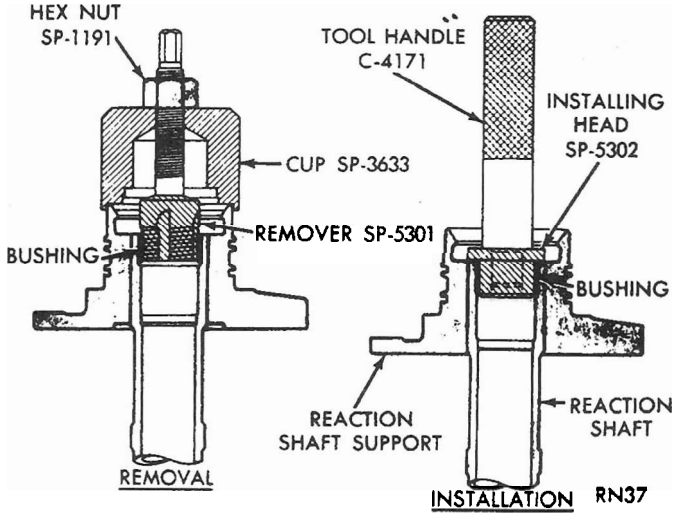



*Fig. 17—Replacing Reaction Shaft Bushing (A-727)*

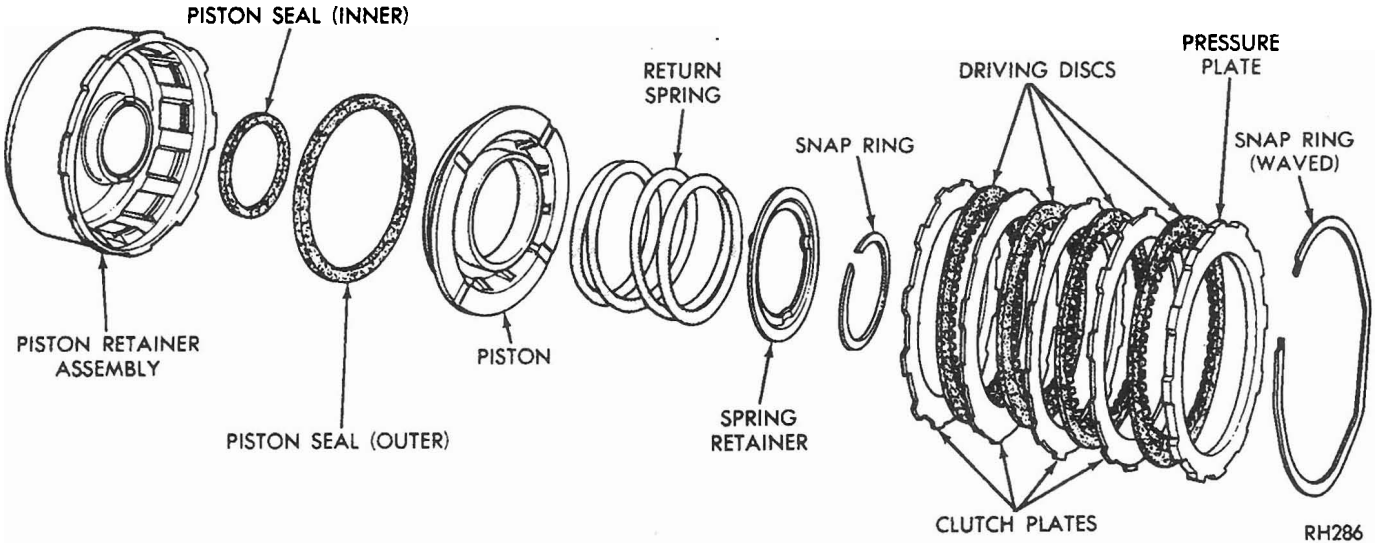



*Fig. 18—Front Clutch (A-904T and A-999)*

(3) Place a new oil seal in opening of pump housing (lip of seal facing inward) using Tool C-3860A and Handle C-4171, drive seal into housing until tool bottoms.

## FRONT CLUTCH—A-904T and A-999

### *Disassembly*

Figure 18 shows a disassembled view of the front clutch assembly.

(1) Remove large waved snap ring that secures pressure plate in the clutch piston retainer. Lift pressure plate and clutch plates out of the retainer.

(2) Install compressor Tool C-3575A, over piston spring retainer (Fig. 19). Compress spring and remove snap ring, then slowly release tool until spring retainer is free of the hub. Remove tool, retainer, and spring.

(3) Invert clutch retainer assembly and bump it on a wooden block to remove the piston. Remove seals from the piston and clutch retainer hub.

### *Inspection*

Inspect plates and discs for flatness. They must not be warped or cone shaped.

Inspect facing material on all driving discs. Replace discs that are charred, glazed or heavily pitted. Discs should also be replaced if they show evidence of material flaking off or if facing material can be scraped off easily. Inspect driving disc splines for wear or other damage. Inspect steel plate and pressure plate surfaces for burning, scoring or damaged driving lugs. Replace if necessary.

Inspect steel plate lug grooves in clutch retainer for smooth surfaces; plates must travel freely in grooves. Inspect band contacting surface on clutch retainer for scores, the contact surface should be protected from damage during disassembly and handling. Note ball check in clutch retainer, make sure ball moves freely. Inspect piston seal surfaces in clutch retainer for nicks or deep scratches. Light scratches will not interfere with sealing of seals. Inspect clutch retainer inner bore surface for wear from reaction shaft support seal rings. Inspect clutch retainer bushing for wear or scores.

Inspect inside bore of piston for score marks, if light, remove with crocus cloth. Inspect seal grooves for nicks and burrs. Inspect seals for deterioration, wear, and hardness. Inspect piston spring, retainer and snap ring for distortion.

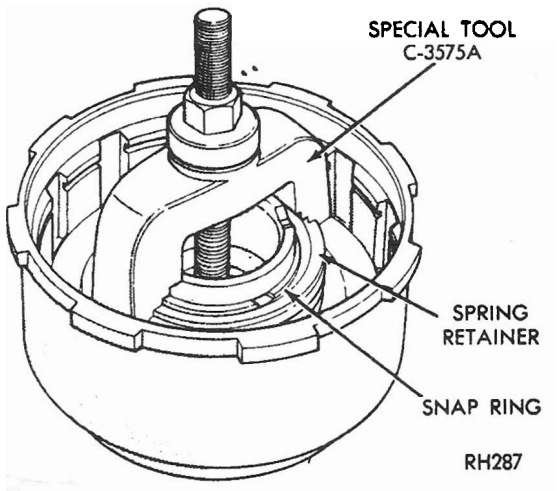



*Fig. 19—Front Clutch Spring Retaining Snap Ring (A-904T and A-999)*

### *Front Clutch Retainer Bushing Replacement—A-904T and A-999*

(1) Lay clutch retainer (open end down) on a clean, smooth surface and place removing head Tool SP-3627 in the bushing (Fig. 20). Install handle Tool C-4171 in removing head.

(2) Drive bushing straight down and out of clutch retainer bore. Be careful not to cock tool in the bore.

(3) Lay clutch retainer (open end up) on a clean, smooth surface. Slide a new bushing on installing head Tool SP-3626, and start them in clutch retainer bore.

(4) Install handle in installing head. Drive bushing into clutch retainer until tool bottoms.

(5) Thoroughly clean clutch retainer before assembly and installation.

### *Assembly*

(1) Lubricate and install inner seal on hub of clutch retainer. Make sure lip of seal faces down and seal is properly seated in the groove (Fig. 18).

(2) Install outer seal on the clutch piston, with lip of seal toward bottom of clutch retainer. Apply a coating of wax type lubricant or Door Ease to outer edge of seals and press seal to bottom of its groove around piston diameter for easier installation of piston assembly. Place piston assembly in retainer and carefully seat piston in bottom of retainer.

(3) Place spring on piston hub and position spring retainer and snap ring on the spring. Compress spring with Tool C-3575A (Fig. 19), and seat snap ring in hub groove. Remove compressor tool.

(4) Lubricate all clutch plates, install one steel plate followed by a lined plate (disc) until the number given in specifications is installed. Install pressure plate and snap ring. Make sure snap ring is properly seated.

(5) Insert a feeler gauge between pressure plate and waved snap ring to measure maximum clearance where snap ring is waved away from pressure plate (Fig. 21). See "Specifications" for allowed clearance.

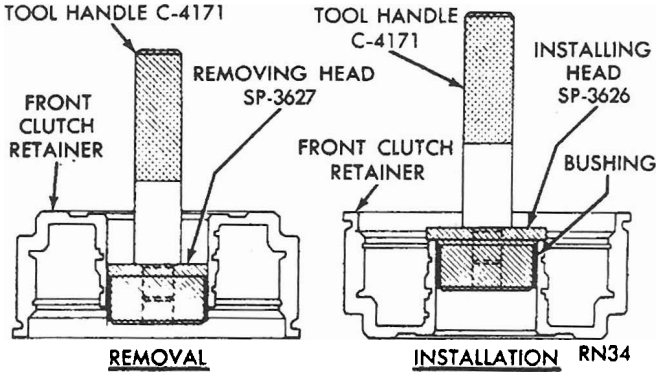



*Fig. 20—Replace Front Clutch Retainer Bushing (A-904T and A-999)*

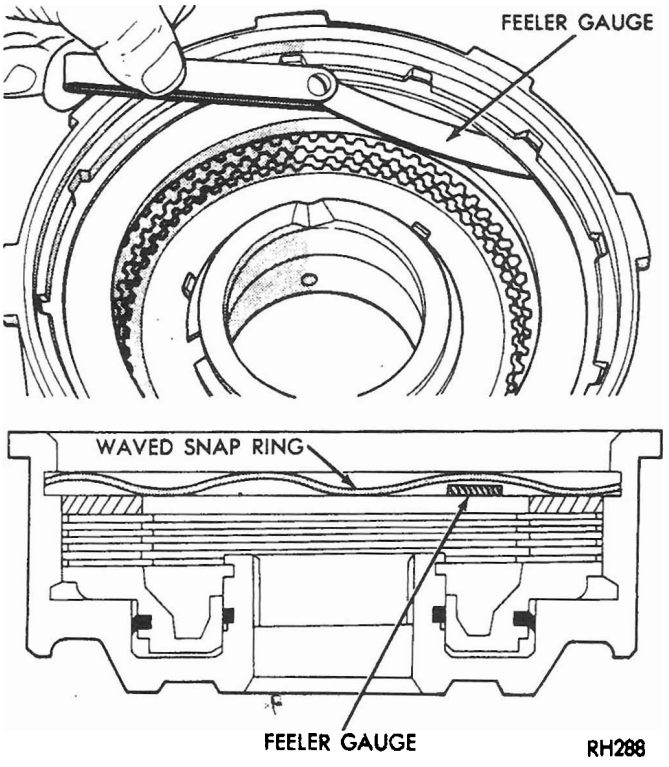



*Fig. 21—Measure Front Clutch Plate Clearance*

## FRONT CLUTCH—A-727

### *Disassembly*

Figure 22 shows a disassembled view of the front clutch assembly.

(1) Remove large waved snap ring that secures pressure plate in clutch piston retainer. Lift pressure plate and clutch plates out of the retainer. (Snap ring in 5 disc clutch is not waved.)

(2) Install compressor Tool C-3863A, over piston spring retainer (Fig. 23). Compress springs and remove snap ring, then slowly release tool until spring retainer is free of hub. Remove tool, retainer, and springs.

(3) Invert clutch retainer assembly and bump it on a wooden block to remove piston. Remove seals from piston and clutch retainer hub.

### *Inspection*

Inspect plates and discs for flatness. They must not be warped or cone shaped.

Inspect facing material on all driving discs. Replace discs that are charred, glazed or heavily pitted. Discs should also be replaced if they show evidence of material flaking off or if facing material can be scraped off easily. Inspect driving disc splines for wear or other damage. Inspect steel plate and pressure plate surfaces for burning, scoring or damaged driving lugs. Replace if necessary.

Inspect steel plate lug grooves in clutch retainer for smooth surfaces; plates must travel freely in the

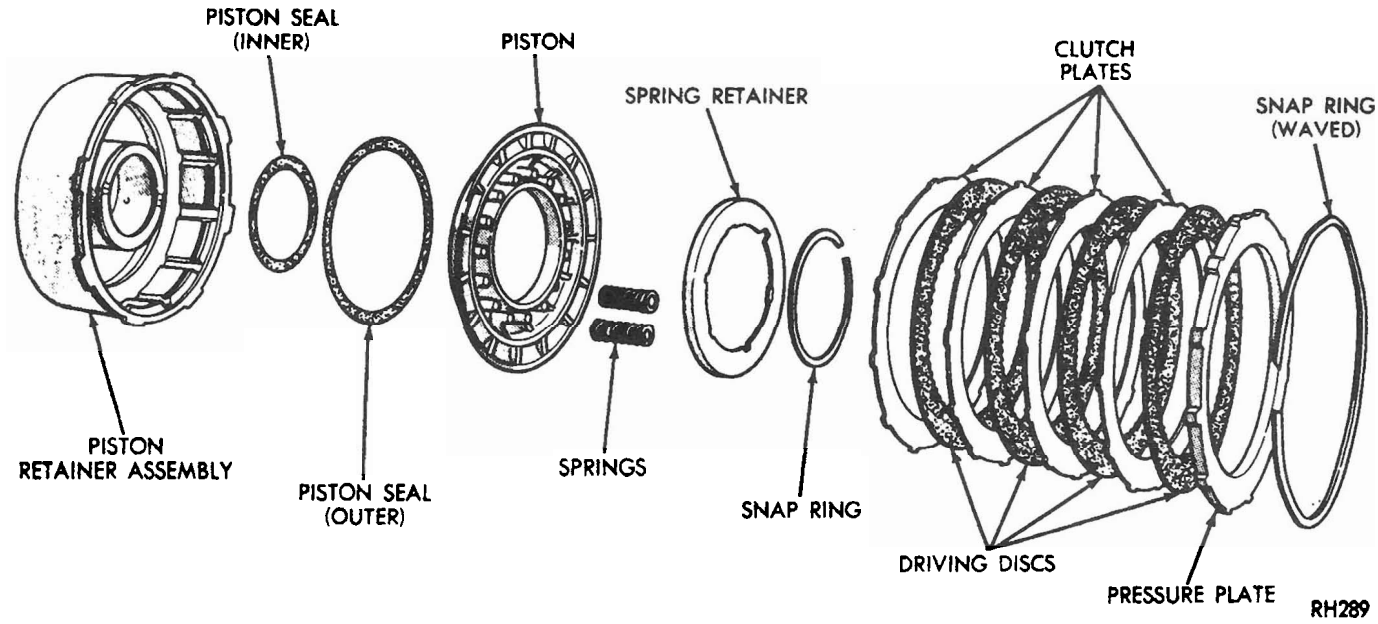
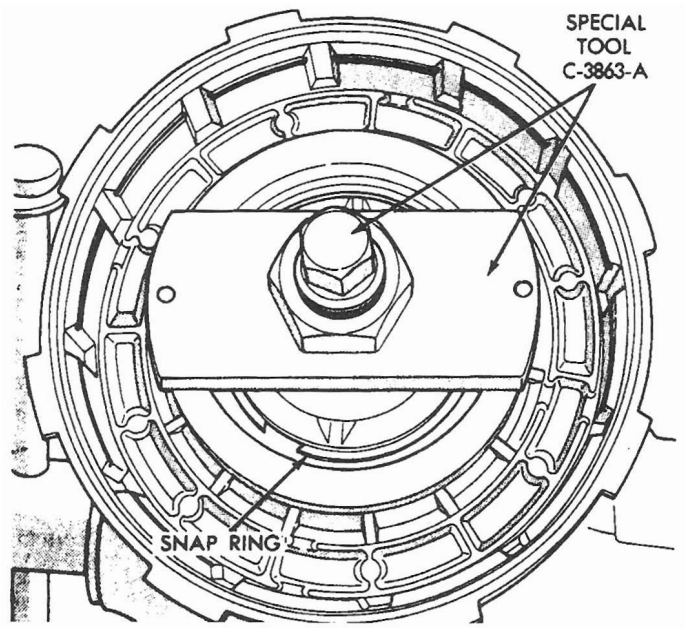



*Fig. 22—Front Clutch (A-727)*

grooves. Inspect band contacting surface on clutch retainer for scores. Note ball check in clutch retainer, make sure ball moves freely. Inspect seal surfaces in clutch retainer for nicks or deep scratches. Light scratches will not interfere with sealing of seals. Inspect clutch retainer bushing for wear or scores.

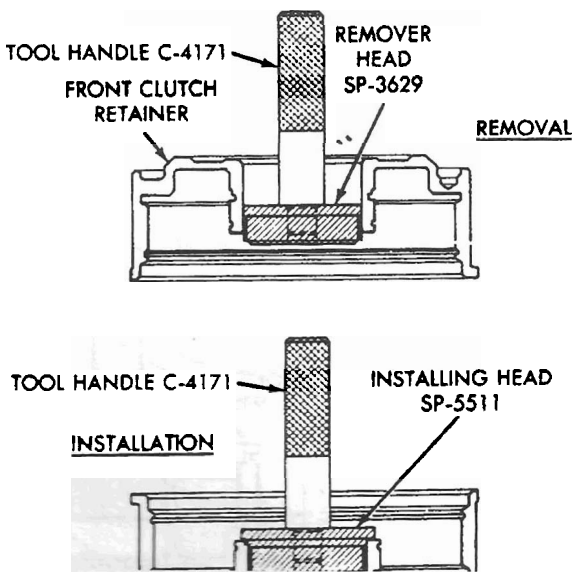
Inspect inside bore of piston for score marks, if light, remove with crocus cloth. Inspect seal grooves for nicks and burrs. Inspect rubber seals for deterioration, wear, and hardness. Inspect all piston springs, retainer, and snap ring for distortion.




### *Front Clutch Retainer Bushing Replacement—A-727*

(1) Lay clutch retainer (open end down) on a clean, smooth surface and place removing head Tool SP-3629 in the bushing. Install handle Tool C-4171 in removing head (Fig. 24).

(2) Drive bushing straight down and out of clutch retainer bore. Be careful not to cock tool in the bore.



(3) Lay clutch retainer (open end up) on a clean, smooth surface. Slide a new bushing on installing head Tool SP-5511, and start them in clutch retainer bore.

(4) Install handle in the installer. Drive bushing into clutch retainer until tool bottoms.

(5) Thoroughly clean clutch retainer before assembly and installation.

### *Assembly*

(1) Lubricate and install inner seal on hub of clutch retainer. Make sure lip of seal faces down and seal is properly seated in the groove.

(2) Install outer seal on the clutch piston, with lip of seal toward bottom of clutch retainer. Apply a coating of wax type lubricant or Door Ease to outer edge of seals and press seal to bottom of its groove around piston diameter for easier installation of piston assembly. Place piston assembly in retainer and carefully seat piston in bottom of retainer.

(3) Refer to "Specifications" and install proper number of springs on piston exactly as shown in Figure 25 or 26. Position spring retainer and snap ring over the springs. Compress springs with Tool C-3863-A (Fig. 23), and seat snap ring in hub groove. Remove compressor tool.

(4) Lubricate all clutch plates, install one steel plate followed by a lined plate (disc) until the number given in specifications is installed. Install pressure plate and snap ring. Make sure snap ring is properly seated.

(5) Insert a feeler gauge between pressure plate and waved snap ring to measure maximum clearance where snap ring is waved away from pressure plate (Fig. 21). See "Specifications" for allowed clearance.

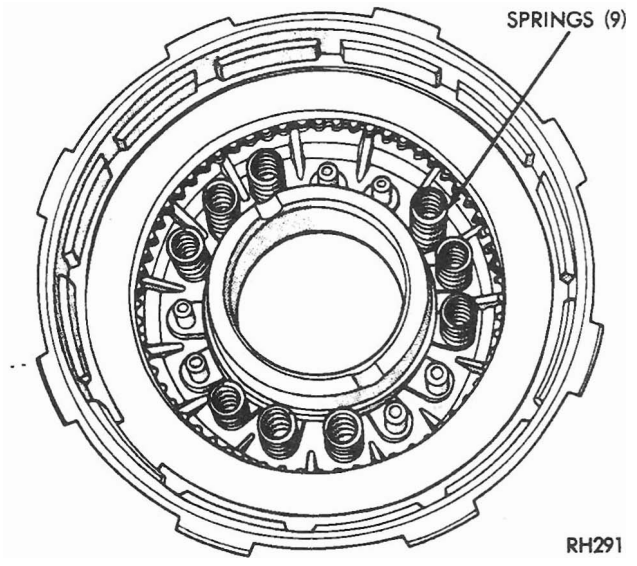



*Fig. 25—Front Clutch Spring Location (9 Springs)*

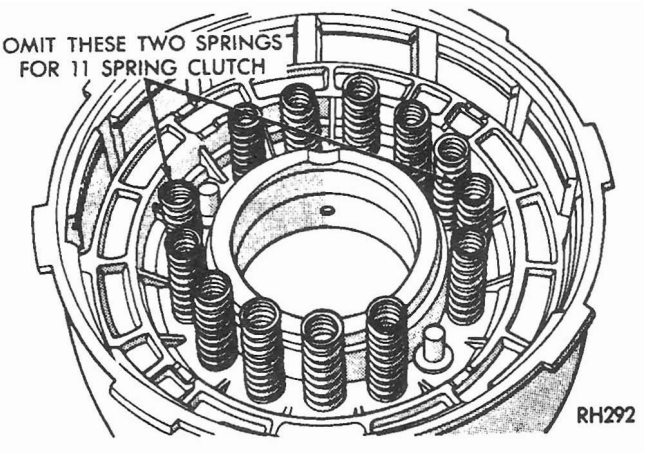



*Fig. 26—Front Clutch Spring Location (11 and 13 Springs)*

## REAR CLUTCH—A-904T and A-999

### *Disassembly*

Figure 27 shows a disassembled view of the rear clutch assembly.

(1) Remove large selective snap ring that secures pressure plate in clutch piston retainer. Lift pressure plate, clutch plates, and inner pressure plate out of the retainer.

(2) Carefully pry one end of wave spring out of its groove in clutch retainer, then remove wave spring, and clutch piston spring.

(3) Invert clutch piston retainer assembly and bump it on a wooden block to remove piston. Remove seals from piston.

(4) If necessary, remove snap ring and press input shaft from piston retainer.

### *Inspection*

Inspect facing material on all driving discs. Replace discs that are charred, glazed or heavily pitted. Discs should also be replaced if they show evidence of material flaking off or if facing material can be scraped off easily. Inspect driving disc splines for wear or other damage. Inspect steel plate and pressure plate surfaces for burning, scoring or damaged driving lugs. Replace if necessary. Inspect plates and discs for flatness, they must not be warped or cone-shaped.

Inspect steel plate lug grooves in clutch retainer for smooth surfaces; plates must travel freely in the grooves. Note ball check in clutch retainer, make sure ball moves freely. Inspect seal rings surfaces in clutch retainer for nicks or deep scratches. Light scratches will not interfere with sealing of the seals. Inspect neoprene seal rings for deterioration, wear and hardness. Inspect piston spring and wave spring for distortion or breakage.

Inspect teflon and/or cast iron seal rings on input shaft for wear (Fig. 27). If required, replacement rings

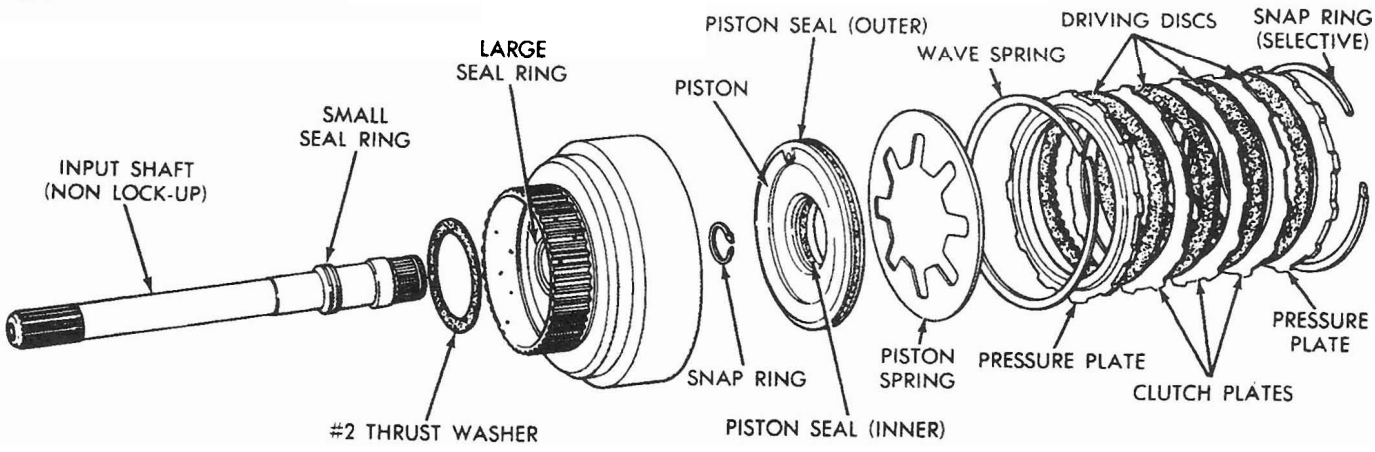



*Fig. 27—Rear Clutch (A-904T and A-999 Nonlock-Up)*

will be cast iron hooked-joint type. Do not remove rings unless conditions warrant. Inspect rear clutch to front clutch #2 thrust washer for wear. Washer thickness should be .061 to .063 inch, replace if necessary.

### Assembly

(1) If removed, press input shaft into piston retainer and install snap ring.

(2) Lubricate and install inner and outer seals on clutch piston. Make sure seal lips face toward input shaft, and seals are properly seated in piston grooves (Fig. 27).

(3) Place piston assembly in retainer and, with a twisting motion, seat piston in bottom of retainer.

(4) Place clutch piston spring on top of piston in clutch retainer. Start one end of wave spring in retainer groove (Fig. 28), then progressively push or tap spring into place making sure it is fully seated in the groove.

(5) Install inner pressure plate in clutch retainer with raised portion of plate resting on the spring.

(6) Lubricate all clutch plates, install one lined disc followed by a steel plate until all plates are installed. Install outer pressure plate and selective snap ring.

(7) Measure rear clutch plate clearance by having an assistant press down firmly on outer pressure plate, then insert a feeler gauge between the plate and snap ring (Fig. 29).

See "Specifications" for allowed clearance. If necessary, install a new snap ring of proper thickness to obtain specified clearance. Low limit clearance is desirable. **Rear clutch plate clearance is very important in obtaining proper clutch operation. Clearance can be adjusted by the use of various thickness outer snap rings. Snap rings are available in .060,**

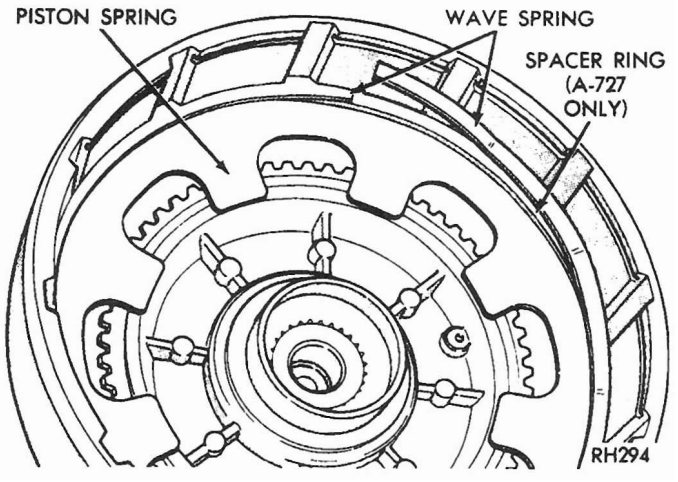



*Fig. 28—Install Rear Clutch Spring*

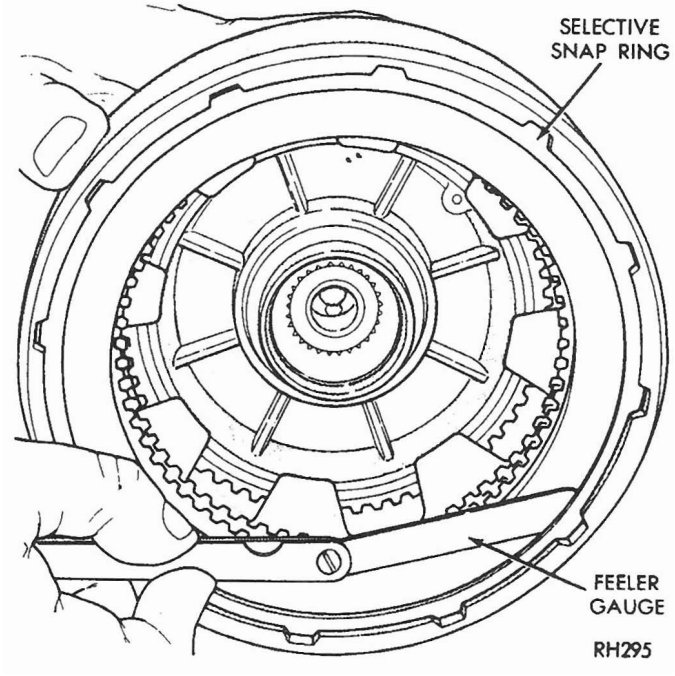



*Fig. 29—Measure Rear Clutch Plate Clearance*

.076, and .098 inch thickness.

(8) Grease cupped side of #3 thrust plate and install cupped side over input shaft.

## REAR CLUTCH—A-727

### *Disassembly*

Figure 30 shows a disassembled view of the rear clutch assembly.

(1) Remove large selective snap ring that secures pressure plate in clutch retainer. Lift pressure plate, clutch plates, and inner pressure plate out of the retainer.

(2) Carefully pry one end of wave spring out of its groove in clutch retainer, then remove wave spring, spacer ring, and clutch piston spring.

(3) Invert clutch piston retainer assembly and bump it on a wooden block to remove piston. Remove seals from the piston.

(4) If necessary, remove snap ring and press input shaft from clutch piston retainer.

### *Inspection*

Inspect plates and discs for flatness. They must not be warped or cone shaped.

Inspect facing material on all driving discs. Replace discs that are charred, glazed or heavily pitted. Discs should also be replaced if they show evidence of material flaking off or if facing material can be scraped off easily. Inspect driving disc splines for wear or other damage. Inspect steel plate and pressure plate surfaces for burning, scoring or damaged driving lugs. Replace if necessary.

Inspect steel plate lug grooves in clutch retainer for smooth surfaces; plates must travel freely in the grooves. Note ball check in the piston, make sure ball moves freely. Inspect seal surfaces in clutch retainer for nicks or deep scratches. Light scratches will not interfere with sealing of seals. Inspect seals for deterioration, wear, and hardness. Inspect piston spring, wave spring, and spacer for distortion or breakage.

Inspect seal rings (Fig. 30) on input shaft for wear or broken locks, make sure they turn freely in the grooves. Do not remove rings unless conditions warrant. Inspect bushing in input shaft for wear or scores. Inspect rear clutch to front clutch #2 thrust washer for wear. Washer thickness should be .061 to .063 inch, replace if necessary.

### *Input Shaft Bushing Replacement (A-727 only)*

(1) Clamp input shaft in a vise with soft jaws, being careful not to clamp on seal ring lands or bearing journals.

(2) Assemble the remover Tool SP-3630, cup Tool SP-3633, and hex-nut Tool SP-1191 (Fig. 31).

(3) With cup held firmly against clutch piston retainer, thread remover into bushing as far as possible by hand.

(4) Using a wrench, screw remover into bushing 3 to 4 additional turns to firmly engage threads in the bushing.

(5) Turn hex nut down against cup to pull bushing from input shaft.

(6) Thoroughly clean input shaft to remove chips made by remover threads. Make certain small lubrica-

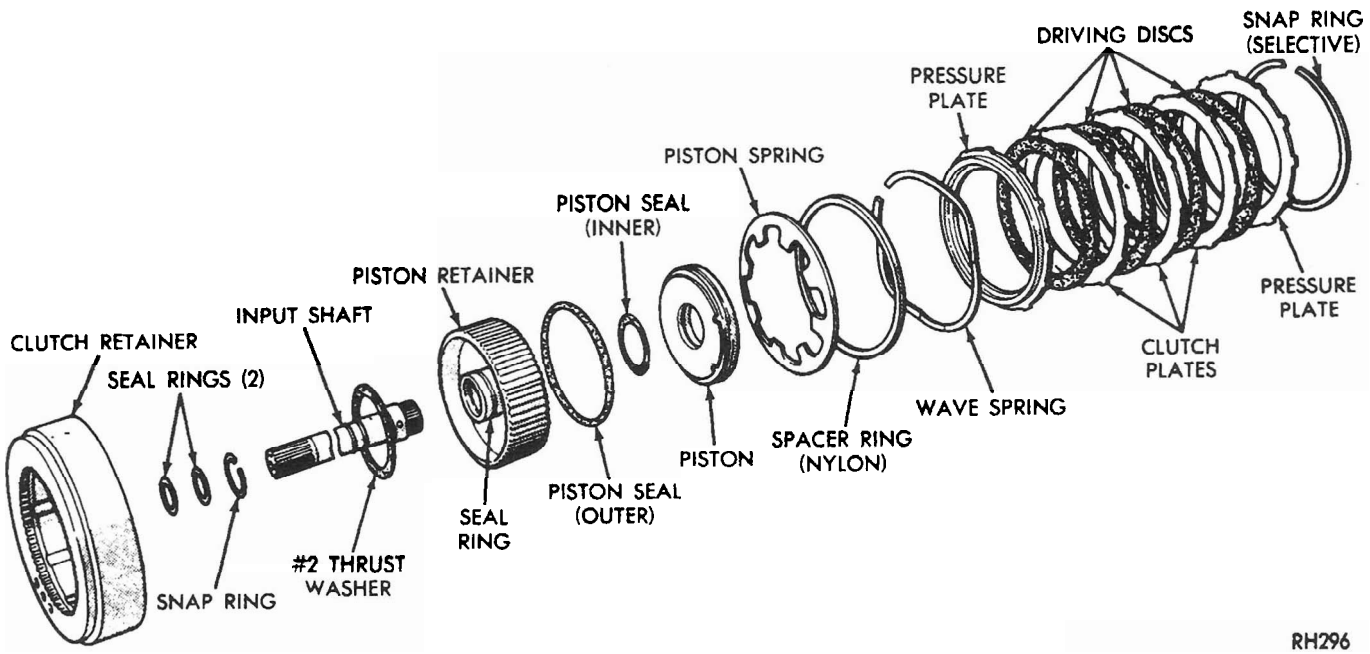



*Fig. 30—Rear Clutch (A-727)*

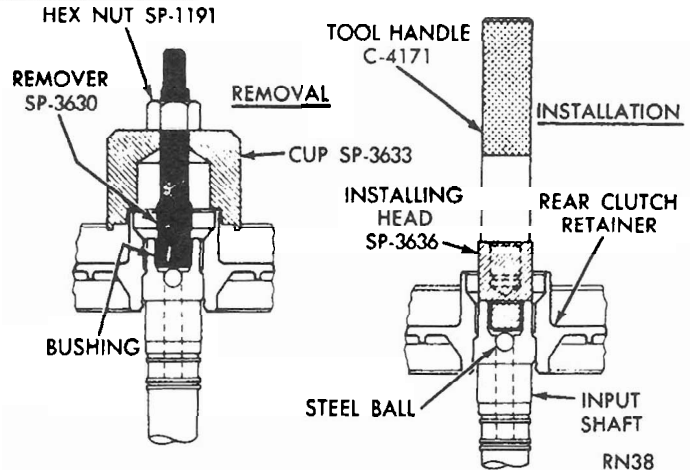



*Fig. 31—Replacing Input Shaft Bushing (A-727)*

tion hole next to ball in end of shaft is not plugged with chips. Be sure no chips are lodged next to the steel ball.

(7) Slide a new bushing on installing head Tool SP-3636 and start them in the bore of input shaft.

(8) Stand input shaft upright on a clean, smooth surface and install handle Tool C-4171 in the installing head (Fig. 31). Drive bushing into shaft until tool bottoms.

(9) Thoroughly clean input shaft and clutch piston retainer before assembly and installation.

### *Assembly*

(1) If removed, press input shaft into clutch piston retainer and install snap ring.

(2) Lubricate and install inner and outer seals on clutch piston. Make sure seal lips face toward input shaft, and seals are properly seated in piston grooves (Fig. 30).

(3) Place piston assembly in retainer and, with a twisting motion, seat piston in bottom of the retainer.

(4) Position clutch retainer over piston retainer splines and support the assembly so clutch retainer remains in place.

(5) Place clutch piston spring and spacer ring on top of piston in clutch retainer, make sure spring and spacer ring are positioned in the retainer recess. Start one end of wave spring in retainer groove (Fig. 28), then progressively push or tap spring into place making sure it is fully seated in the groove.

(6) Install inner pressure plate in clutch retainer with raised portion of plate resting on the spring.

(7) Lubricate all clutch plates, install one lined disc followed by a steel plate until all plates are installed. Install outer pressure plate and selective snap ring.

(8) Measure rear clutch plate clearance by having an assistant press downward firmly on outer pressure plate, then insert a feeler gauge between the plate and snap ring (Fig. 29). See "Specifications" for allowed clearance. If necessary, install a new snap ring of proper thickness to obtain specified clearance. Low limit clearance is desirable. **Rear clutch plate clearance is very important in obtaining proper clutch operation. The clearance can be adjusted by the use of various thickness outer snap rings. Snap rings are available in .060, .074, .088, and .106 inch thickness.**

(9) Install #3 thrust washer on rear end of input shaft, using grease to hold in place.

## PLANETARY GEAR TRAIN—A-904T and A-999

### *End Play*

Measure end play of planetary gear assemblies, sun gear and driving shell before removing these parts from output shaft. Stand assembly upright with forward end of output shaft on a wooden block so that all parts will move forward against selective snap ring at front of shaft. Insert a feeler gauge between rear annulus gear support hub and shoulder on output shaft. (Fig. 32). The clearance should be .005 to .048 inch. If clearance exceeds specifications, replace thrust washers and/or necessary parts.

### *Disassembly (Fig. 33)*

(1) Remove selective #3 thrust washer from forward end of output shaft.

(2) Remove selective snap ring from forward end of output shaft, then slide front planetary assembly off the shaft.

(3) Remove snap ring and #4 thrust washer from forward hub of front planetary gear assembly, slide front annulus gear and support off planetary gear assembly. Remove #5 thrust washer from front side of planetary gear assembly. Remove #6 thrust washer from rear side of planetary gear assembly. If necessary, remove snap ring from front of annulus gear to separate support from annulus gear.

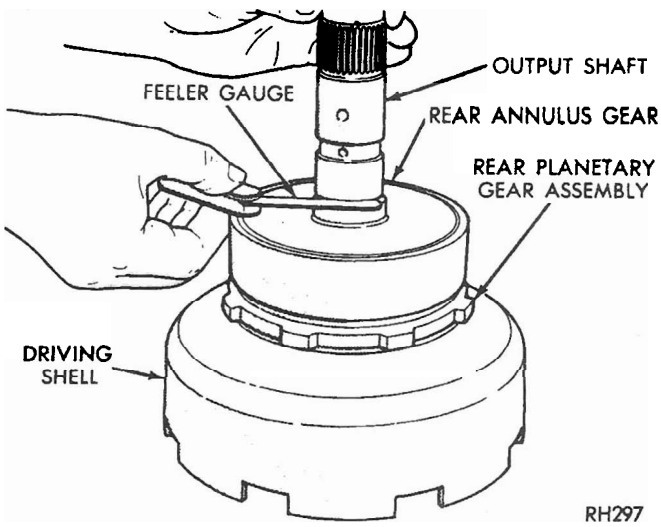



*Fig. 32—Measure End Play of Planetary Gear Train*

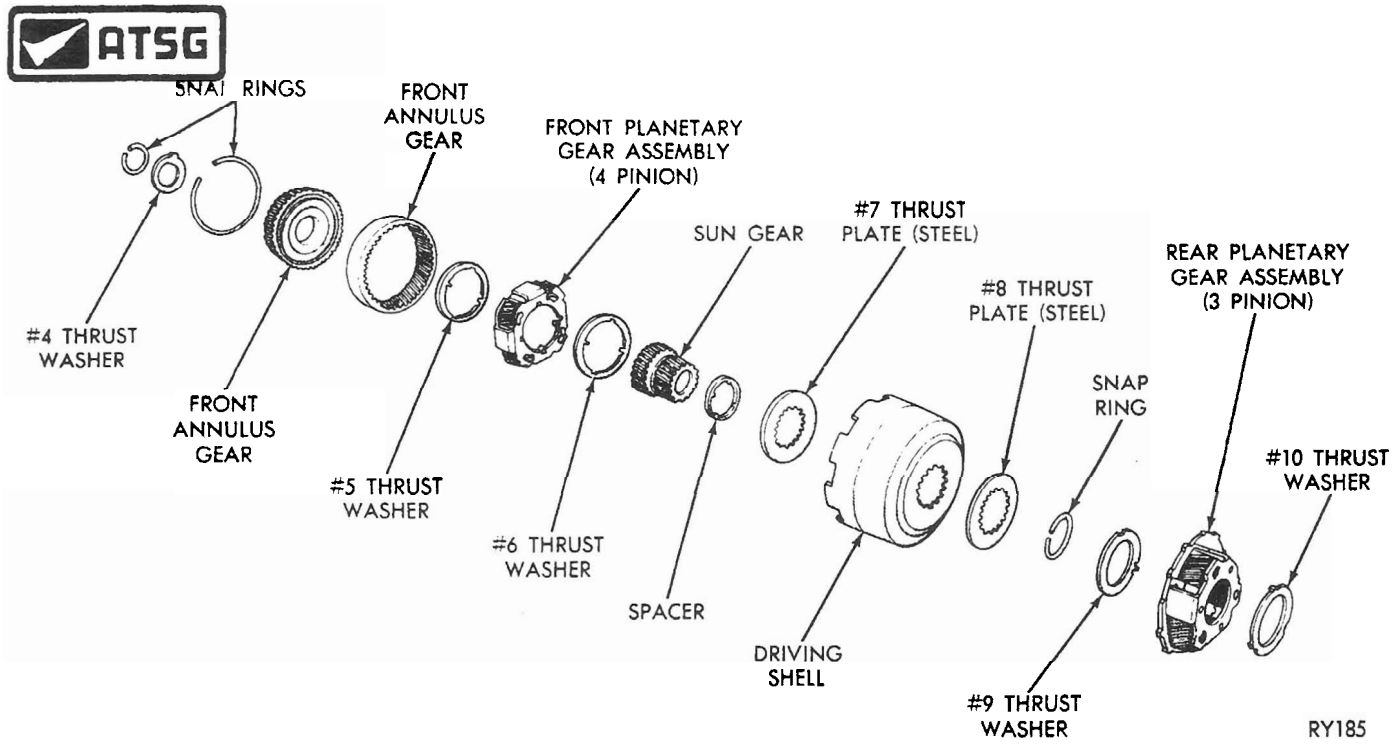



***Fig. 33—Wide-Ratio Planetary Gear Train***

(4) Slide sun gear, driving shell, and rear planetary assembly off the output shaft.

(5) Lift sun gear and driving shell off rear planetary assembly. Remove snap ring and #8 thrust plate from sun gear (rear side of driving shell). Slide sun gear out of driving shell, and remove spacer (Fig. 33), and #7 thrust plate from opposite end of sun gear, if necessary.

(6) Remove #9 thrust washer from forward side of rear planetary assembly and remove planetary gear assembly from rear annulus gear. Remove #10 thrust washer from rear side of planetary assembly. If necessary, remove snap ring from rear of annulus gear to separate support from annulus gear.

### *Inspection*

Inspect bearing surfaces on output shaft for nicks, burrs, scores or other damage. Light scratches, small nicks or burrs can be removed with crocus cloth or a fine stone. Inspect speedometer drive gear for any nicks or burrs, and remove with a sharp-edged stone. Make sure all oil passages in shaft are open and clean.

Inspect bushings in sun gear for wear or scores, replace sun gear assembly if bushings are damaged. Inspect all thrust washers for wear and scores, replace if damaged or worn below specifications. Inspect thrust faces of planetary gear carriers for wear, scores or other damage, replace as required. Inspect planetary gear carrier for cracks and pinions for broken or worn gear teeth, and for broken pinion shaft welds. Inspect annulus gear and driving gear teeth for damage. Replace distorted lock rings.

### *Assembly*

Refer to Figure 33 for parts reference.

(1) Place rear annulus gear support in annulus gear and install snap ring.

(2) Position #10 thrust washer on rear side of rear planetary gear assembly and install in rear annulus gear. Install #9 thrust washer on front side of rear planetary gear assembly.

(3) Insert output shaft in rear opening of rear annulus gear. Carefully work shaft through annulus gear support and planetary gear assembly. Make sure shaft splines are fully engaged in splines of annulus gear support.

(4) Install #7 thrust plate and spacer on wide-ratio transmissions (Fig. 33) on one end of sun gear. Insert sun gear through front side of driving shell, install #8 thrust plate and snap ring.

(5) Carefully slide driving shell and sun gear assembly on the output shaft, engaging sun gear teeth with rear planetary pinion teeth.

(6) Place front annulus gear support in the annulus gear and install snap ring.

(7) Position #5 thrust washer on front side of front planetary gear assembly. Position front planetary gear assembly in front annulus gear, place #4 thrust washer over planetary gear assembly hub and install snap ring. Position #6 thrust washer on rear side of planetary gear assembly.

(8) Carefully work front planetary and annulus gear assembly on output shaft, meshing planetary pinions with sun gear teeth.

(9) With all components properly positioned, install selective snap ring on front end of output shaft.

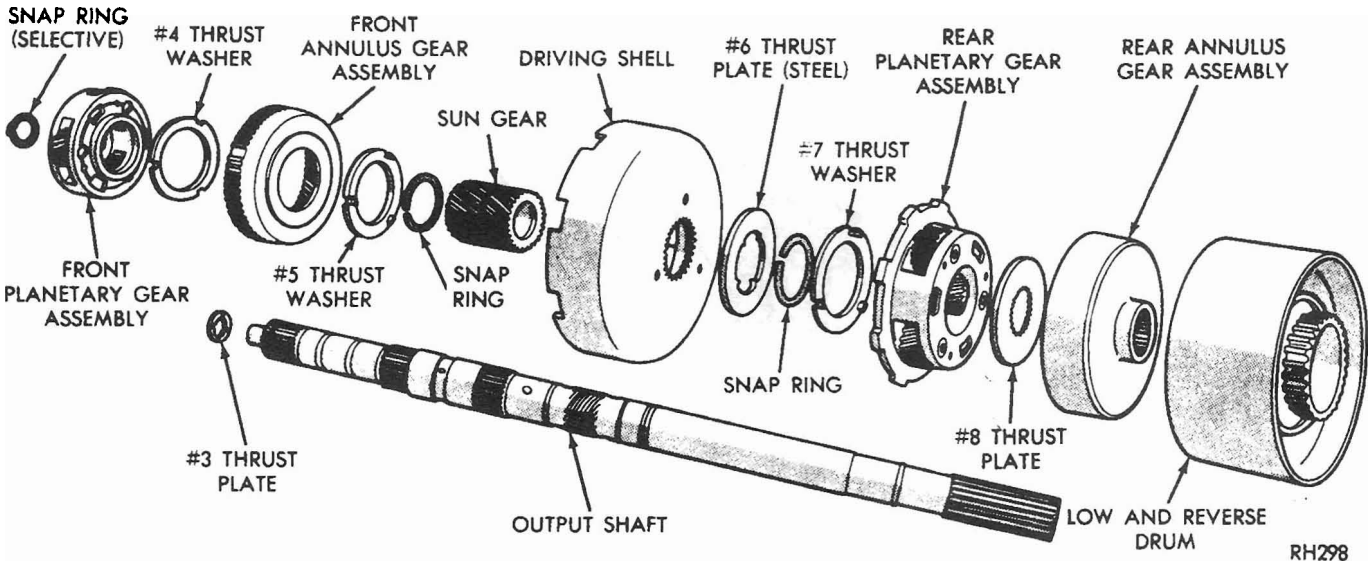



*Fig. 34—Planetary Gear Train and Output Shaft (A-727)*

Remeasure end play of the assembly. **The clearance can be adjusted by the use of various thickness snap rings. Snap rings are available in .042, .064, and .084 inch thickness.**

## PLANETARY GEAR TRAIN—A-727 (Fig. 34)

### *End Play*

Measure end play of planetary gear assemblies, sun gear and driving shell before removing these parts from output shaft. Stand assembly upright with forward end of output shaft on a wooden block so that all parts will move forward against selective snap ring at front of shaft. **Insert a feeler gauge between rear** annulus gear support hub and shoulder on output shaft (Fig. 32). **The clearance should be .006 to .048 inch.** If clearance exceeds specifications replace thrust washers and/or necessary parts.

### *Disassembly*

(1) Remove #3 thrust plate from forward end of output shaft (Fig. 34).

(2) Remove selective snap ring from forward end of output shaft, then slide front planetary assembly off the shaft.

(3) Slide front annulus gear off planetary gear assembly. Remove #4 thrust washer from rear side of planetary gear assembly.

(4) Slide sun gear, driving shell, and rear planetary assembly off output shaft.

(5) Lift sun gear and driving shell off rear planetary gear assembly. Remove #5 thrust washer from inside the driving shell. Remove snap ring and #6 thrust plate from sun gear (rear side of driving shell) and slide sun gear out of the shell. Remove front snap ring from sun gear if necessary. Note that front end of sun gear is longer than rear.

(6) Remove #7 thrust washer from forward side of rear planetary gear assembly, remove planetary gear set and #8 thrust plate from rear annulus gear.

### *Inspection*

Inspect bearing surfaces on output shaft for nicks, burrs, scores or other damage. Light scratches, small nicks or burrs can be removed with crocus cloth or a fine stone. Inspect speedometer drive gear for any nicks or burrs, and remove with a sharp-edged stone. Make sure all oil passages in shaft are open and clean.

Inspect bushings in sun gear for wear or scores, replace sun gear assembly if bushings are damaged. Inspect all thrust washers for wear and scores, replace if damaged or worn below specifications. Inspect thrust faces of planetary gear carriers for wear, scores or other damage, replace as required. Inspect planetary gear carrier for cracks and pinions for broken or worn gear teeth and for broken pinion shaft lock pins. Inspect annulus gear and driving gear teeth for damage. Replace distorted lock rings.

### *Assembly*

Refer to Figure 34 for parts identification.

(1) Install rear annulus gear on the output shaft. Apply a thin coat of grease on #8 thrust plate, place it on the shaft and in the annulus gear making sure teeth are over the shaft splines.

(2) Position rear planetary gear assembly in the rear annulus gear. Place #7 thrust washer on front side of planetary gear assembly.

(3) Install snap ring in front groove of sun gear (long end of gear). Insert sun gear through front side of driving shell, install rear #6 thrust plate and snap ring.

(4) Carefully slide driving shell and sun gear assembly on output shaft, engaging sun gear teeth with rear

planetary pinion teeth. Place #5 thrust washer inside the front driving shell.

(5) Place #4 thrust washer on rear hub of front planetary gear assembly, then slide assembly into front annulus gear.

(6) Carefully work front planetary and annulus gear assembly on output shaft, meshing planetary pinions with the sun gear teeth.

(7) With all components properly positioned, install selective snap ring on front end of output shaft. Remeasure end play of the assembly. **The clearance can be adjusted by the use of various thickness snap rings. Snap rings are available in .048, .055, and .062 inch thickness.**

## OVERRUNNING CLUTCH

### *Inspection*

Inspect clutch rollers for smooth, round surfaces, they must be free of flat spots and chipped edges. Inspect roller contacting surfaces in the cam and race for brinelling. Inspect roller springs for distortion, wear or other damage.

**A-727:** Inspect cam set screw for tightness. If loose, tighten and restake the case around screw.

### *Overrunning Clutch Cam Replacement— A-904T and A-999*

If overrunning clutch cam or spring retainer are found damaged, they can be replaced with a service replacement cam, spring retainer, and retaining bolts (Fig. 35).

The service parts are retained in the case with bolts instead of rivets. To install, proceed as follows:

(1) Remove four bolts securing output shaft support to rear of the transmission case. Tap support rearward out of the case with a soft-faced hammer.

(2) Center punch the rivets exactly in center of each rivet head (Fig. 36).

(3) Drill through each rivet head with a 3/8 inch drill. Be careful not to drill into the transmission case.

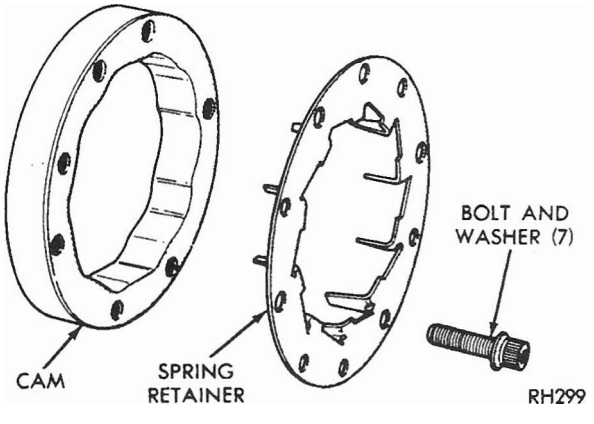



*Fig. 35—Overrunning Clutch Service Replacement® Cam (A-904T and A-999)*

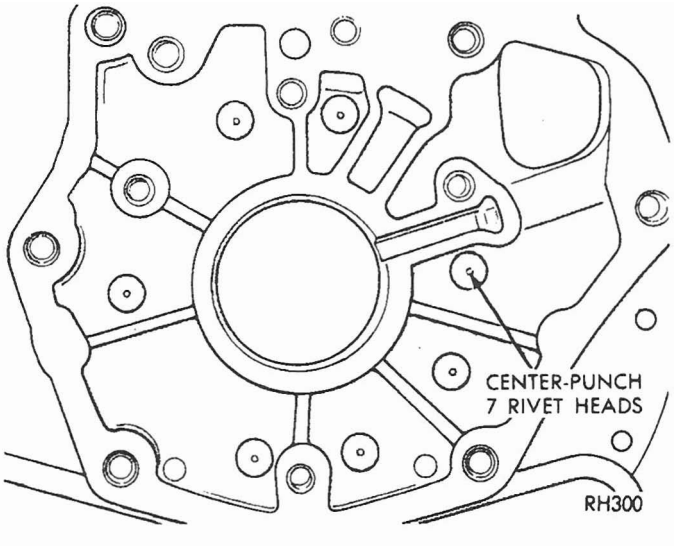



*Fig. 36—Center Punch Rivet Heads (A-904T and A-999)*

Chip off rivet heads with a small chisel, then drive rivets and cam from the case with a blunt punch of proper size.

(4) Carefully enlarge rivet holes in the case with a 17/64 inch drill. Remove all chips and foreign matter from the case, make sure cam area is free of chips and burrs.

(5) To install, position cam and roller spring retainer in the case. Align cam bolt holes with holes in the case, then thread all seven retaining bolt and washer assemblies into cam a few turns. The cone washers must be installed so inner diameter is coned toward the bolt head (Fig. 37).

(6) Tap cam firmly into the case if necessary. Draw retaining bolts down evenly, then tighten to 100 in. lbs. (11 N·m).

(7) Screw two pilot studs Tool C-3288-B into the case (Fig. 38). Position support over the pilot studs, and tap it firmly into the case with a soft-faced hammer.

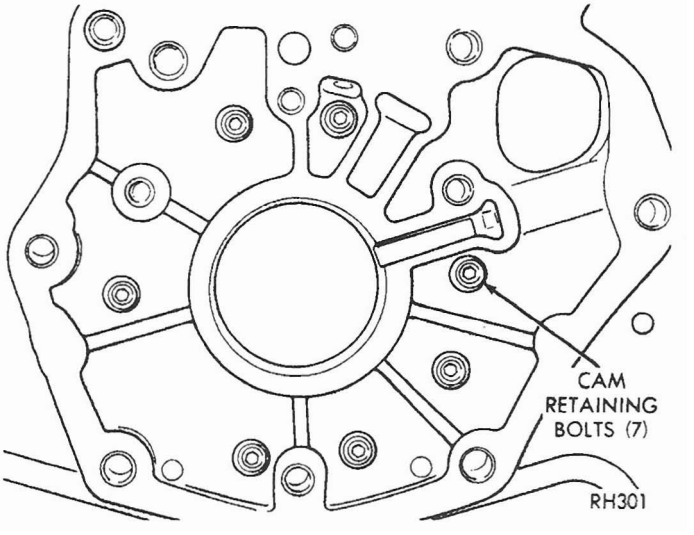



*Fig. 37—Cam Retaining Bolts (A-904T and A-999)*

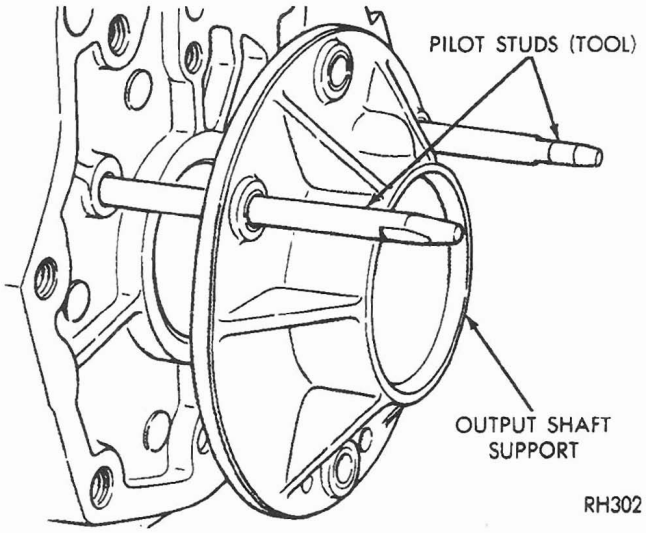



*Fig. 38—Install Output Shaft Support (A-904T and A-999)*

(8) Remove pilot studs, install bolts and tighten to 150 in. lbs. (17 N·m).

### Overrunning Clutch Cam Replacement—A-727

If overrunning clutch cam and/or roller spring retainer are found damaged, replace cam and spring retainer in the following manner:

(1) Remove set screw from the case below clutch cam.

(2) Remove bolts securing output shaft support to rear of transmission case. Insert a punch through bolt holes and drive cam from the case (Fig. 39). Alternate punch from one bolt hole to another so cam will be driven evenly from the case.

The output shaft support must be in the case to install the overrunning clutch cam.

If the support requires replacement, tap support rearward with a soft-faced hammer. To install, screw two C-3288B pilot studs into the case (Fig. 40). Position support over the pilot studs, and tap it firmly into the case with a soft-faced hammer.

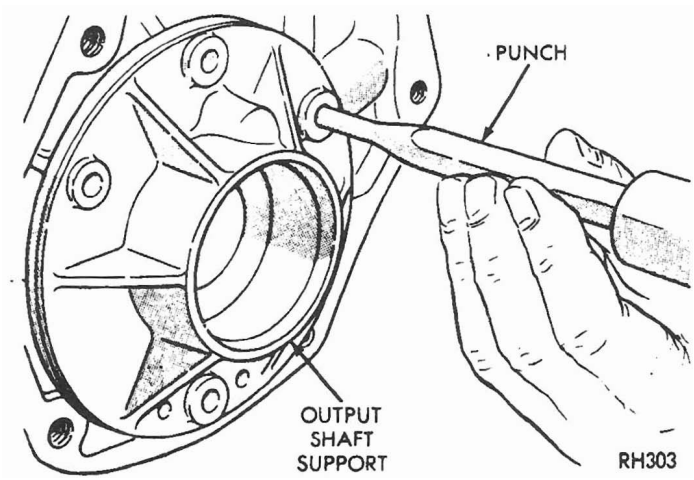



*Fig. 39—Remove Overrunning Clutch Cam (A-727)*

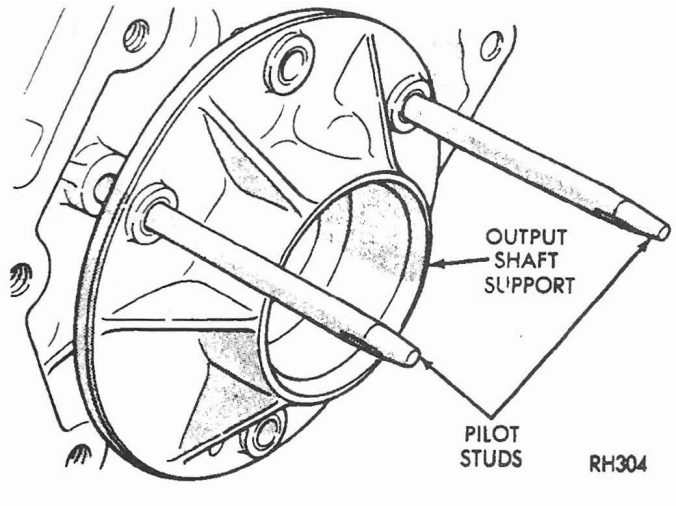



*Fig. 40—Install Output Shaft Support (A-727)*

(3) Clean all burrs and chips from cam area in the case.

(4) Place spring retainer on the cam, making sure retainer lugs snap firmly into notches on the cam.

(5) Position cam in the case with cam serrations aligned with those in the case. Tap cam evenly into the case as far as possible with a soft-faced hammer.

(6) Install Tool C-3863A and Adapter SP-5124 as shown in Figure 41, tighten nut on tool to seat cam into the case. Make cure cam is firmly bottomed, then install cam retaining set screw. Stake the case around set screw to prevent it coming loose.

(7) Remove cam installing tool. Remove pilot studs, install bolts and tighten to 150 in. lbs. (17 N·m). Stake the case around cam in 12 places with a blunt chisel (Fig. 42).

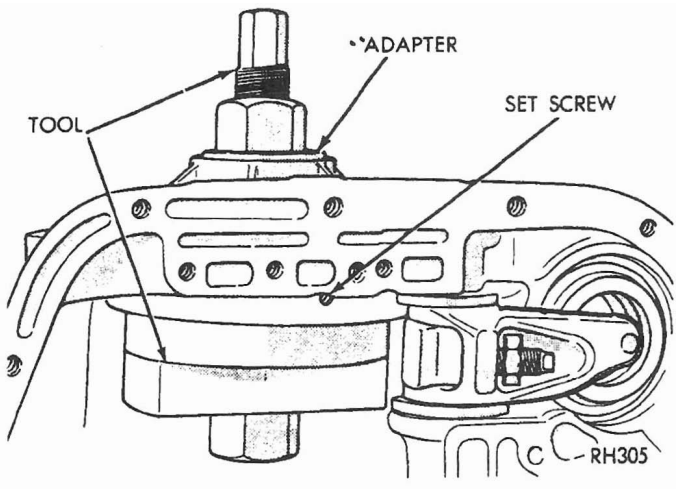



*Fig. 41—Install Overrunning Clutch Cam (A-727)*

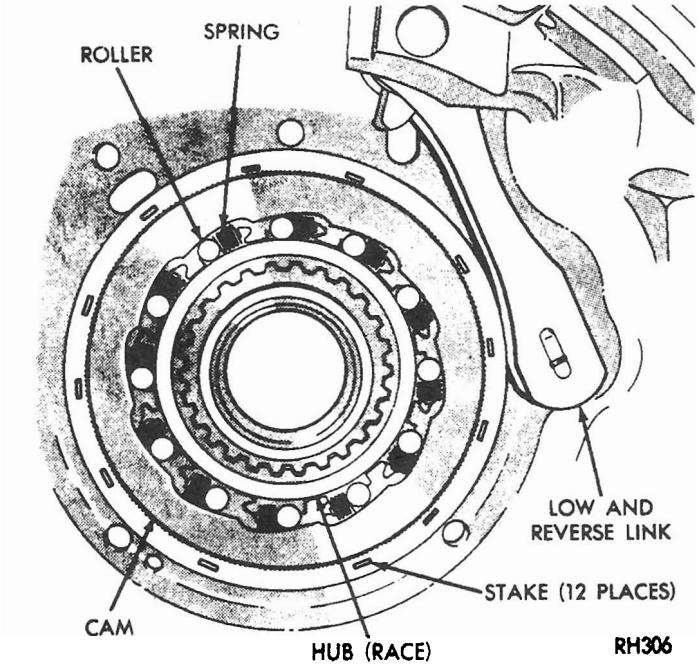



*Fig. 42—Overrunning Clutch, Low-Reverse Band Link*

## KICKDOWN SERVO AND BAND

### *Disassembly*

Disassemble controlled load servo piston by removing small snap ring from servo piston. Then remove washer, spring and piston rod assembly from servo piston.

### *Inspection*

Inspect piston and guide seal rings for wear, and make sure they turn freely in the grooves. It is not necessary to remove seal rings unless conditions warrant. Inspect piston for cracks, burrs, scores and wear. Inspect piston bore in the case for scores or other damage. Inspect fit of guide on piston rod. Inspect piston spring for distortion.

For controlled load servo, inspect bore in piston and "O" ring on piston rod.

Inspect band lining for wear and bond of lining to the band. Inspect lining for black burn marks, glazing, non-uniform wear pattery and flaking. If lining is worn so grooves are not visible at ends or any portion of the bands, replace the band. Inspect band for distortion or cracked ends.

### *Assembly*

Assemble controlled load servo piston as follows (Fig. 43).

(1) Grease "O" ring and install piston rod.

(2) Install piston rod into servo piston.

(3) Install spring, flat washer and snap ring to complete the assembly.

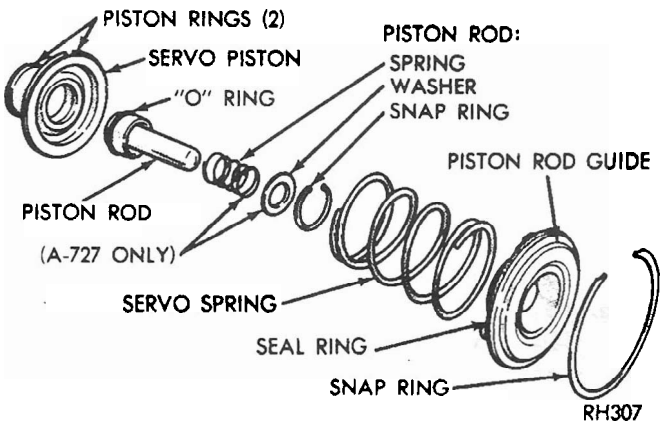



*Fig. 43—Kickdown Servo*

## LOW-REVERSE SERVO AND BAND

### *Diassembly*

(1) Remove snap ring from piston and remove the piston plug and cushion spring (Fig. 44).

### *Inspection*

Inspect seal for deterioration, wear and hardness. Inspect piston and piston plug for cracks, burrs, scores and wear; piston plug must operate freely in the piston. Inspect piston bore in the case for scores or other damage. Inspect springs for distortion.

Inspect band lining for wear and bond of lining to the band. If lining is worn so grooves are not visible at ends or any portion of the band, replace the band. Inspect band for distortion or cracked ends.

### *Assembly*

(1) Lubricate and insert piston plug and cushion spring in the piston, and secure with snap ring.

## ASSEMBLY—SUBASSEMBLY INSTALLATION

The assembly procedures given here include installation of subassemblies in the transmission case and adjusting input shaft end play. Do not use force to assemble mating parts. If parts do not assemble freely, investigate the cause, and correct the trouble before

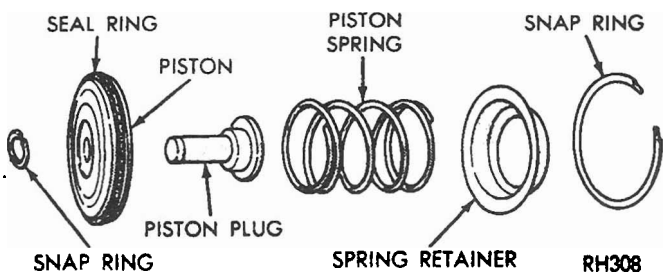



*Fig. 44—Low-Reverse Servo*

proceeding with assembly procedures. Always use new gaskets during assembly operations.

Use only automatic transmission fluid to lubricate transmission parts during assembly.

### *Overrunning Clutch*

(1) With transmission case in an upright position, insert clutch hub inside the cam. Install overrunning clutch rollers and springs as shown in Figure 42.

### *Low-Reverse Servo, Band, and Linkage—A-727 (Fig. 45)*

(1) Carefully work servo piston assembly into the case with a twisting motion. Place spring retainer, and snap ring over the piston (Fig. 44).

(2) Compress low-reverse servo piston spring by using engine valve spring compressor Tool C-3422A, then install snap ring.

(3) Position rear band in the case, install short strut, then connect long link and anchor to the band. Screw in band adjuster just enough to hold strut in place. Install low-reverse drum. Be sure long link and anchor assembly is installed as shown in Figure 42, to provide running clearance for the low-reverse drum.

### *Double-wrap Low-Reverse Band (A-904T and A-999) (Figs. 46 and 47)*

(1) Push band reaction pin (with new "O" ring) into case flush with gasket surface.

(2) Place band into case resting two lugs against band reaction pin.

(3) Install low-reverse drum into overrunning clutch and band.

(4) Install operating lever with pivot pin flush in case and adjusting screw touching center lug on band.

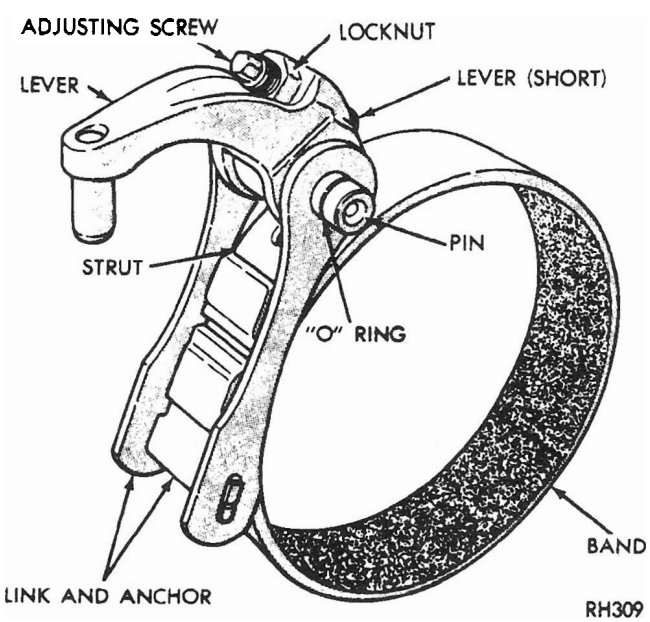



*Fig. 45—Low-Reverse Band and Linkage (A-727)*

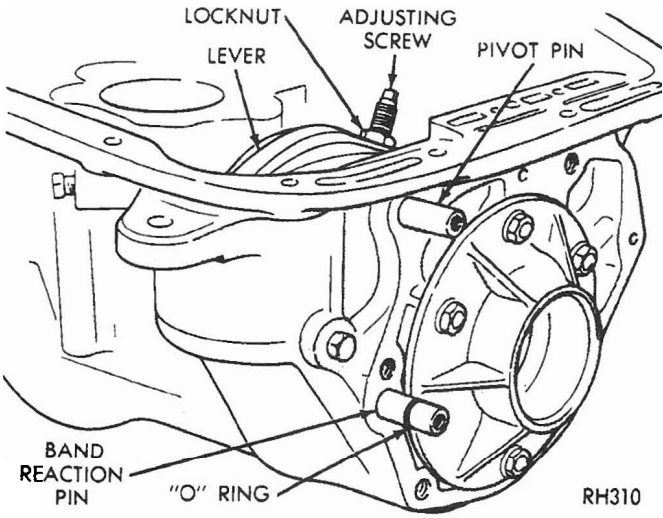



*Fig. 46—Double-Wrap Band Linkage (A-904T and A-999)*

### *Kickdown Servo (Fig. 43)*

(1) Carefully push servo piston assembly into the case bore. Install spring, guide, and snap ring.

(2) Compress kickdown servo springs by using engine valve spring compressor Tool C-3422-A, then install snap ring.

### *Planetary Gear Assemblies, Sun Gear, and Driving Shell*

(1) While supporting assembly in the case, insert output shaft through rear support. Carefully work assembly rearward engaging rear planetary carrier lugs into low-reverse drum slots.

Be very careful not to damage ground surfaces on output shaft during installation.

### *Front and Rear Clutch Assemblies*

The front and rear clutches, front band, oil pump and reaction shaft support are more easily installed with transmission in an upright position.

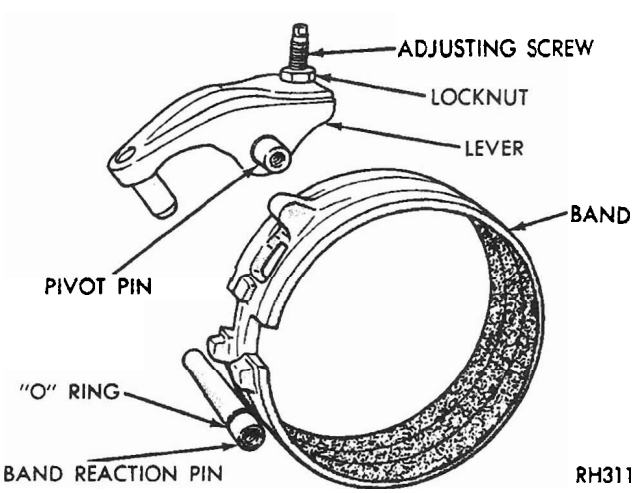



*Fig. 47—Double-Wrap Band and Linkage (A-904T and A-999)*

One method to support transmission, is outlined in Steps (1) and (2).

(1) Cut a 3 1/2 inch (89 mm) diameter hole in a bench, in the end of a small oil drum, or a large wooden box strong enough to support transmission. Cut or file notches at edge of the 3 1/2 inch (89 mm) hole so output shaft support will fit and lay flat in the hole.

(2) Carefully insert output shaft into hole to support the transmission upright, with its weight resting on flange of the output shaft support.

(3) **A-904T and A-999:** Apply a light coat of grease to selective thrust washer and install washer on front end of the output shaft. Apply a light coat of grease to input shaft thrust plate and install over input shaft. If input shaft end play was not within specifications (.022 to .091 inch), when tested before disassembly, replace thrust washer with one of proper thickness. Refer to thrust washer number 3 in "Specifications" for sizes available.

**A-727:** Apply a coat of grease on the input to output shaft thrust plate Number 3 (Fig. 34), and install plate on front end of the output shaft. Apply a light coat of grease to the 3-tab thrust washer and install in rear clutch piston retainer.

(4) Align front clutch plate inner splines, and place assembly in position on the rear clutch. Make sure plate splines are fully engaged on rear clutch splines.

(5) Align rear clutch plate inner splines, grasp input shaft and lower the two clutch assemblies into the transmission case.

(6) Carefully work clutch assemblies in a circular motion to engage rear clutch splines over splines of front annulus gear. Make sure front clutch drive lugs are fully engaged in slots in the driving shell.

### *Kickdown Band (Fig. 48)*

(1) Slide band over front clutch assembly.

(2) Install band strut, screw in adjuster just enough to hold strut and anchor in place.

### *Oil Pump and Reaction Shaft Support*

If difficulty was encountered in removing pump assembly due to an exceptionally tight fit in the case, it may be necessary to expand the case with heat during pump installation. Using a suitable heat lamp, heat the case in area of pump for a few minutes prior to installing pump and reaction shaft support assembly.

**A-904T and A-999:** Install number one thrust washer on reaction shaft support hub (Fig. 9).

**A-727:** If input shaft end play was not within specifications (.034 to .084 inch) when measured before disassembly, replace thrust washer on reaction shaft support hub with one of proper thickness (Fig. 14). Refer to thrust washer number one in "Specifications" for sizes available.

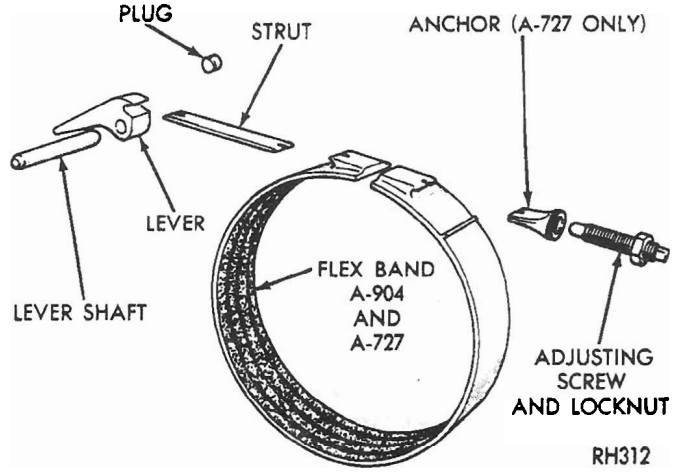



*Fig. 48—Kickdown Band and Linkage*

(1) Screw two pilot studs Tool C-3288-B in pump opening in the case (Fig. 49). Install a new gasket over the pilot studs.

(2) Place a new rubber seal ring in the groove on outer flange of pump housing. Make sure seal ring is not twisted. Coat seal ring with grease for easy installation.

(3) Install pump assembly in the case; tap it lightly with a soft mallet, if necessary. Remove pilot studs, install bolts and snug down evenly.

Rotate input and output shafts to see if any binding exists, then tighten bolts to 175 in. lbs. (20 N·m). Check shafts again for free rotation.

(4) Adjust both bands as described in "Maintenance and Adjustments" Section.

### *Governor and Support*

(1) Position support and governor body assembly on the output shaft. Align assembly so governor valve

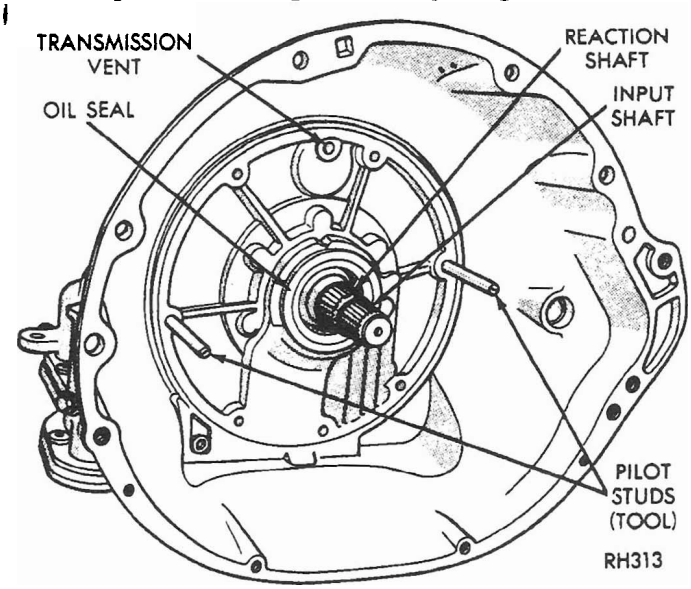



*Fig. 49—Installing Oil Pump*

shaft hole in governor body aligns with hole in output shaft, then slide assembly into place. Install snap ring behind the governor body. Tighten body to support self-locking bolts to 95 in. lbs. (11 N·m).

(2) Place governor valve on valve shaft, insert assembly into body and through governor weights. Install valve shaft retaining snap ring.

***Output Shaft Bearing and Extension Housing (or Adapter on 4-W-D Vehicles)***

(1) Install a snap ring in the front groove (A-727 only) on output shaft. Install bearing on shaft with its outer race ring groove toward front. Press or tap bearing tight against front snap ring (or shoulder on A-904T and A-999) then install rear snap ring.

(2) On 4-W-D vehicles, use door-ease lubricant on output shaft bearing O-ring. Drive the bearing into adapter using Tool C-4203 inverted with Handle C-4171.

(3) Place a new extension housing gasket on the transmission case. Position output shaft bearing retaining snap ring as far as possible then carefully tap extension housing (or adapter) into place. Make sure snap ring is fully seated in the bearing groove.

(4) Install and tighten extension housing (or adapter) bolts to 32 ft. lbs. (43 N·m).

(5) Install gasket, plate, and screws on bottom of extension housing mounting pad.

Measure input shaft end play as described under "Disassembly—Subassembly Removal." Correct if necessary (Fig. 5).

***Valve Body Assembly and Accumulator Piston***

(1) Make sure combination back-up lamp/neutral start switch is not installed in transmission case.

(2) Place valve body manual lever in low position to move parking rod to rear position.

(3) Use a screwdriver to push park sprag into engagement with parking gear, turning output shaft to verify engagement. This will allow "knob" on end of parking rod to move past the sprag as valve body is installed.

(4) Install accumulator piston in the transmission case (Fig. 50).

(5) Place valve body in position, working park rod through opening and past sprag. Install retaining bolts finger tight.

(7) With neutral-starting switch installed, place manual lever in the neutral position. Shift valve body, if necessary, to center neutral finger over the neutral switch plunger. Snug bolts down evenly, then tighten to 105 in. lbs. (12 N·m).

(8) Connect lock-up solenoid wire to wiring connector at rear of transmission case, if so equipped.

(9) Install gearshift lever and tighten clamp bolt. Check lever shaft for binding in the case by moving lever through all detent positions. If binding exists, loosen valve body bolts and realign.

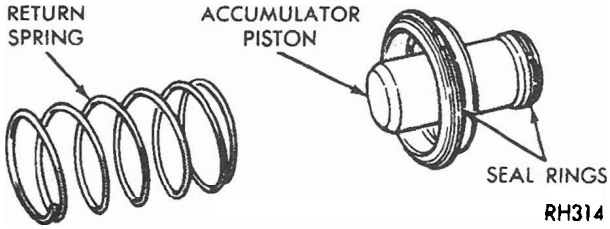



*Fig. 50—Accumulator Piston and Spring*

(10) Make sure throttle shaft seal is in place, then install flat washer and throttle lever and tighten the clamp bolt.

(11) Position the round magnet over the bump in the front, right hand corner of the oil pan.

(12) Install oil pan, and a new gasket.

## TRANSMISSION, TORQUE CONVERTER, AND DRIVE PLATE INSTALLATION

**The transmission and torque converter must be installed as an assembly; otherwise, the torque converter drive plate, pump bushing, and oil seal will be damaged. None of the weight of transmission should be allowed to rest on the plate during installation.**

(1) Rotate pump gears with Tool C-3756 (A-904T and A-999) or Tool C-3881 (A-727) until the two small holes in handle are vertical (Fig. 51).

(2) Carefully slide torque converter assembly over input shaft and reaction shaft. Make sure torque converter hub slots are also vertical and fully engage pump inner gear lugs.

Test for full engagement by placing a straightedge on face of the case (Fig. 52). The surface of torque

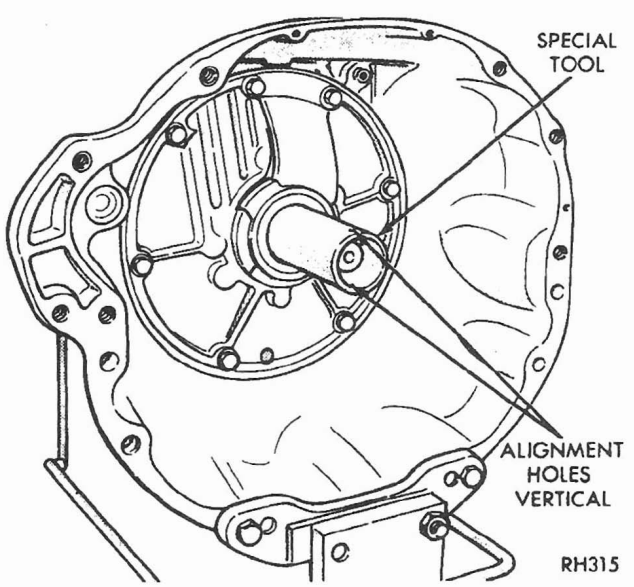



*Fig. 51—Align Pump Inner Gear Lugs*

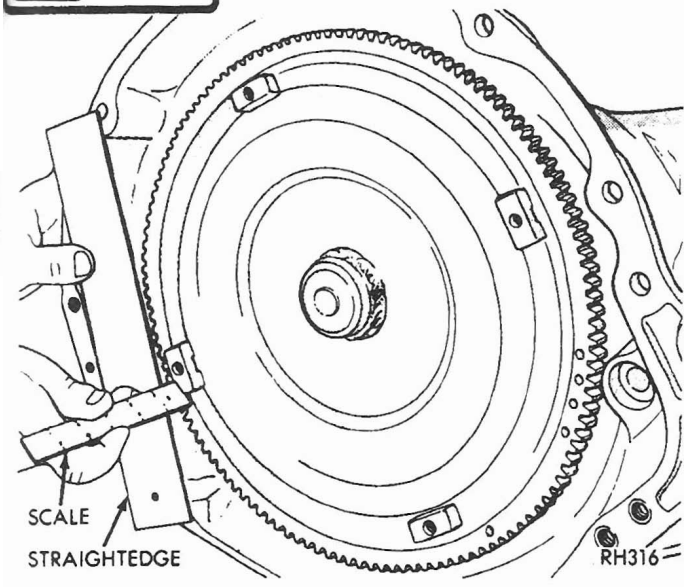



***Fig. 52—Measure Torque Converter for Full Engagement into Transmission***

converter front cover lug should be at least 1/2 inch to rear of straightedge when torque converter is pushed all the way into transmission.

(3) Attach a small C-clamp to edge of torque converter housing to hold torque converter in place during transmission installation.

(4) Inspect torque converter drive plate for distortion or cracks and replace if necessary. Torque the drive plate to crankshaft bolts to 55 ft. lbs. (75 N·m). **When drive plate replacement has been necessary, make sure both transmission dowel pins are in engine block and they are protruding far enough to hold transmission in alignment.**

(5) Coat torque converter hub hole in crankshaft with Multipurpose grease. Place transmission and torque converter assembly on a service jack and position assembly under vehicle for installation. Raise or tilt as necessary until transmission is aligned with engine.

(6) Rotate torque converter so mark on torque converter (made during removal) will align with mark on drive plate. The offset holes in plate are located next to 1/8 inch hole in the inner circle of plate. Carefully work transmission assembly forward over engine block dowels with torque converter hub entering the crankshaft opening.

(7) After transmission is in position, install torque converter housing bolts and tighten to 30 ft. lbs. (41 N·m).

(8) Install crossmember to frame and lower transmission to install mount on extension to the crossmember. Tighten all bolts.

(9) Remove the engine support fixture (Fig. 1).

(10) Install oil filler tube and speedometer cable.

(11) Connect throttle rod to transmission lever.

(12) Connect gearshift rod and torque shaft assembly to transmission lever and frame.

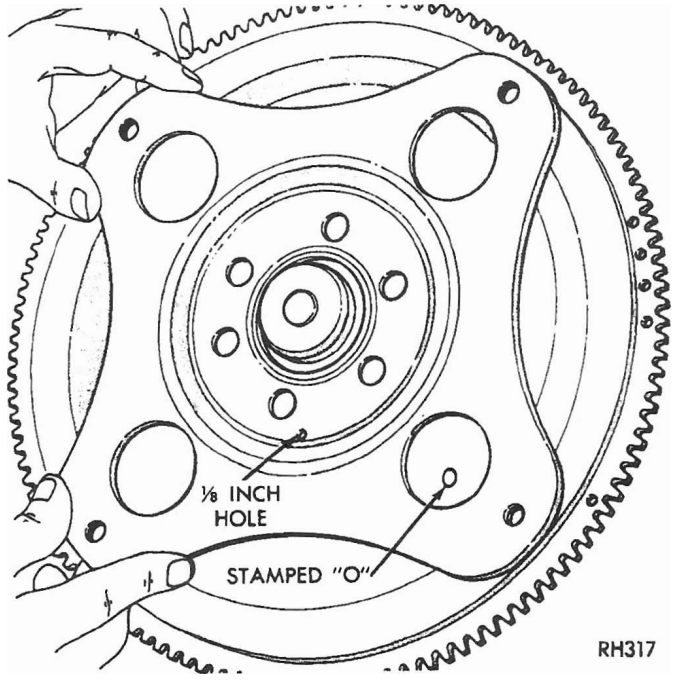



***Fig. 53—Torque Converter and Drive Plate Markings***

**When it is necessary to disassemble linkage rods from levers which use plastic grommets as retainers, the grommets should be replaced with new ones.** Use a prying tool to force rod from grommet in lever, then cut away old grommet. Use pliers to snap new grommet into lever and rod into grommet.

(13) Place wire connector on the combination back-up lamp and neutral/park starter switch.

(14) Connect wiring to lock-up solenoid wiring connector at rear of transmission case, if so equipped.

(15) Rotate engine clockwise with socket wrench on vibration dampener bolt, as needed, to install torque converter to drive plate bolts, matching marks made at removal. Tighten to 270 in. lbs. (31 N·m).

(16) Install torque converter access cover.

(17) Install starter motor and cooler line bracket.

(18) Connect cooler lines to transmission fittings.

(19) Install engine to transmission struts, if so equipped.

**Tighten bolts holding strut to transmission before strut to engine bolts.**

(20) Install transfer case, if so equipped. Refer to "Transfer Case Installation" for procedure.

(21) Replace exhaust system if it was disturbed for clearance.

(22) Carefully guide sliding yoke into extension housing and on the output shaft splines. Align marks made at removal then connect propeller shaft(s) to axle pinion shaft yoke(s).

(23) Adjust gearshaft and throttle linkage.

(24) Refill transmission with MOPAR ATF PLUS (Automatic Transmission Fluid) Type 7176.

## SPECIFICATIONS

## LOADFLITE TRANSMISSIONS

| Transmission Models: | | A-904T/A-999 | | A-727 | |
|---|---|---|---|---|---|
| TYPE | | Automatic Three Speed with Torque Converter | | | |
| TORQUE CONVERTER DIAMETER (Standard) | | 10-3/4 inches | | 10-3/4 inches | |
| | | U.S. Measure | Metric Measure | U.S. Measure | Metric Measure |
| OIL CAPACITY—TRANSMISSION AND TORQUE CONVERTER | Lock-up | 17.1 Pts. | 8.1 Liter | 16.7 Pts. | 7.9 Liter |
| | Nonlock-up | — | — | 17.1 Pts. | 8.1 Liter |
| Use "DEXRON II" Type Automatic Transmission Fluid | | | | | |
| COOLING METHOD | | Water-Heat Exchanger | | | |
| LUBRICATION | | Pump (Gear Type) | | | |
| GEAR RATIOS: | | First | Second | Third | Reverse |
| | A-727 | 2.45 to 1 | 1.45 to 1 | 1 to 1 | 2.21 to 1 |
| | A-904T/A/999 | 2.74 to 1 | 1.54 to 1 | 1 to 1 | 2.21 to 1 |
| PUMP CLEARANCES: | | | | | |
| Outer Gear to Case Bore | | .0035 to .0075 inch | | | |
| Outer to Inner Tip | | .0045 to .0095 inch | | | |
| End Clearance—Gears | | .0004 to .0025 inch | | .001 to .003 inch | |
| GEAR TRAIN END PLAY | | .005 to .048 inch | | .006 to .048 inch | |
| INPUT SHAFT END PLAY | | .022 to .091 inch | | .034 to .084 inch | |
| SNAP RINGS: | | | | | |
| Rear Clutch Snap Ring (Selective) | | .060 to .062 inch | | .060 to .062 inch | |
| | | .068 to .070 inch | | .074 to .076 inch | |
| | | .076 to .078 inch | | .088 to .090 inch | |
| | | .098 to .100 inch | | .106 to .018 inch | |
| Output Shaft (Forward End) | | .040 to .044 inch | | .048 to .052 inch | |
| | | .062 to .066 inch | | .055 to .059 inch | |
| | | .082 to .086 inch | | .062 to .066 inch | |
| CLUTCH PLATE CLEARANCE: | | | | | |
| Front Clutch | | 4 Disc. .067 to .134 inch<br>5 Disc. .075 to .152 inch | | 4 Disc. .082 to .151 inch | |
| Rear Clutch | | 4 Disc. .032 to .055 inch | | 4 Disc. .025 to .045 inch | |

| | A-904T | A-999 | A-727 |
|---|---|---|---|
| CLUTCHES: | | | |
| Engine Cu. In. | 225 | 318 | 318/360 |
| Number of Front Clutch Plates | 4 | 5 | 4 |
| Number of Front Clutch Discs | 4 | 5 | 4 |
| Number of Rear Clutch Plates | 3 | 3 | 3 |
| Number of Rear Clutch Discs | 4 | 4 | 4 |
| Number of Front Clutch Springs | 1 | 1 | 11 |
| BAND ADJUSTMENTS: | | | |
| Kickdown (Front) Turns* | 2-1/2 | 2-1/2 | 2-1/2 |
| Low-Reverse (Internal) Turns* | 4 | 4 | 2 |

*Backed off from 72 inch-pounds (8 N·m).

## SPECIFICATIONS

| THRUST WASHERS: | A-904T/A-999 | A-727 |
|---|---|---|
| Engine | 225/318 CID | ALL |
| Reaction Shaft Support Thrust Washer | #1 .061 to .063 inch | #1 Selective<br>.061 to .063 inch (Natural)<br>.084 to .086 inch (Red)<br>.102 to .104 inch (Yellow) |
| Rear Clutch Retainer Thrust Washer | #2 .061 to .063 inch | #2 .061 to .063 inch (Natural) |
| Input Shaft Thrust Plate | .024 to .026 inch | |
| Output Shaft Thrust Washer | #3 Selective<br>.052 to .054 inch (Tin)<br>.068 to .070 inch (Red)<br>.083 to .086 inch (Green) | #3 .062 to .064 inch |
| Output Shaft Thrust Plate | — | .030 to .032 inch |
| Front Annulus Thrust Washer | #4 .121 to .125 inch | |
| Front Carrier (To Annulus) Thrust Washer | #5 .048 to .050 inch | #4 .059 to .062 inch |
| Drive Shell (To Front Annulus) Thrust Washer | — | #5 .059 to .062 inch |
| Front Carrier (To Drive Shell) Thrust Washer | #6 .048 to .050 inch | |
| Sun Gear Drive Shell Thrust Plate | #7 .050 to .052 inch<br>#8 .050 to .052 inch | #6 .034 to .036 inch |
| Rear Carrier (To Drive Shell) Thrust Washer | #9 .048 to .050 inch | #7 .059 to .062 inch |
| Rear Carrier (To Annulus) Thrust Plate | — | #8 .034 to .036 inch |
| Rear Carrier (To Annulus) Thrust Washer | #10 .048 to .040 inch | |

## TIGHTENING REFERENCE

| Automatic (LoadFlite) A-904T/A-999/A-727 | Ft. Lbs. | N·m |
|---|---|---|
| Cooler Line Fitting | 155* | 18 |
| Cooler Line Nut | 85* | 10 |
| Converter Drive Plate to Crankshaft Bolt | 55 | 75 |
| Converter Drive Plate to Torque Converter Bolt | 270* | 31 |
| Extension Housing to Transmission Case Bolt | 32 | 43 |
| Extension Housing to Insulator Mounting Bolt | 50 | 68 |
| Governor Body to Support Bolt | 95* | 11 |
| Kickdown Band Adjusting Screw Locknut | 30 | 41 |
| Kickdown Lever Shaft Plug | 150* | 17 |
| Lock-up Solenoid Wiring Connector | 150* | 17 |
| Neutral Starter Switch | 25 | 34 |
| Oil Pan Bolt | 150* | 17 |
| Oil Pump Housing to Transmission Case Bolt | 175* | 20 |
| Output Shaft Support Bolt | 150* | 17 |
| Overrunning Clutch Cam Set Screw | 40* | 5 |
| Pressure Test Take-Off Plug | 120* | 14 |
| Reaction Shaft Support to Oil Pump Bolt | 175* | 20 |
| Reverse Band Adjusting Screw Locknut | 25 | 34 |
| Speedometer Drive Clamp Screw | 100* | 11 |
| Transmission to Engine Bolt | 30 | 41 |
| Valve Body Screw | 35* | 4 |
| Valve Body to Transmission Case Bolt | 105* | 12 |

*Inch Pounds

*Inch Pounds

# STALL SPEED

SYMPTOM/CONDITION

Vehicle shakes during breakaway in reverse with medium to heavy throttle application (i.e. backing very slowly up a steep grade or backing up a trailer).

DIAGNOSIS

Warm vehicle to normal operating temperature. Locate a relatively steep grade (where it is safe to stop and back up). Try backing the vehicle up very slowly from a full stop. If a sufficiently steep grade is not available, move the vehicle to an open, flat, paved area where it is safe to stop and back up. Apply the parking brake about half way. Shift to reverse and slowly open the throttle until the vehicle just begins to move. Vehicle speed should be no more than a slow walking pace. Extreme care must be taken not to overheat the transmission during this test. Do not open the throttle more than 10 seconds at a time. Alow the transmission to cool by running at a fast idle in neutral for at least three minutes between attempts to breakaway during either of these tests, do the following repair:

PARTS REQUIRED

1986 Passenger Car Application

Fifth Avenue, Gran Fury, and Diplomat

| Engine | Transmission | Torque Converter | Part Number |
|---|---|---|---|
| 318 (5.2L) | A-999 | Low stall/lock up | 4431113 |

1986 Truck, Ramcharger, Ram Van, Wagon:

| Engine | Transmission | Torque Converter | Part Number |
|---|---|---|---|
| 225 (3.7L) | A-904 | High stall/lock up | 4431115 |
| 225 (3.7L) | A-904 | High stall/non-lock up | 4431117 |
| 225 (3.7L) | A-727 | High stall/lock up | 4431125 |
| 318 (5.2L) | A-999 | Low stall/lock up | 4431113 |
| 318 (5.2L) | A-999 | High stall/lock up | 4431119 |
| 318 (5.2L) | A-727 | Low stall/non-lock up | 4431123 |
| 360 (5.9L) | A-727 | High stall/non-lock up | 4431121 |
| 360 (5.9L) | A-727 | Low stall/non-lock up | 4431127 |

REPAIR PROCEDURE

This repair involves the replacement of the torque converter.

1. Check engine for any driveability problems. Low carburetor air flow, early EGR valve operation, etc. have been found to be a contributor to reverse shake in some vehicles.

2. Perform a propane adjustment and/or correct any other driveability problems that may exist with the vehicle, using the appropriate Driveability Test Procedure.

3. If correcting any driveability problems with the vehicles does not eliminate the reverse shake, then it will be necessary to replace the torque converter with a new one.

4. Select the appropriate torque converter for the vehicle from the parts list.

5. Replace the torque converter per the appropriate service manual instructions.

6. Road test the vehicle and check for leaks.

# SURGING

This bulletin supersedes Technical Service Bulletin 18-55-86, whick should be removed from your files.

This repair only applies to subject vehicles equipped with a Federal Emission Package. It does not apply to 5.2L 2BBL heavy duty engines (identified by a "4" in the eighth [engine] character of the VIN).

SYMPTOM/CONDITION

Vehicle may exhibit a surge between steady speeds of 35 and 55 mph, with engine at full operating temperature.

DIAGNOSIS

Road test the vehicle at a steady speed between 35 and 55 mph to verify surge condition. Engine must be at full operating temperature. The surge normally is worse just after transmission lock-up engagement.

PARTS REQUIRED

Drive Package PN 4419440

Consists of:

| | | |
|---|---|---|
| 1 | ESA/EFC Module | PN 4379255 |
| 1 | 6.2# Transmission Lock-Up Spring | PN 4202672 |
| 1 | Transmission Pan Gasket | PN 4295875 |
| 1 | Authorized Modification Label | PN 4275086 |

REPAIR PROCEDURE

This repair involves replacement of the transmission lock-up spring and a revised ESA/EFC module. The lock-up speed will be raised from approximately 43 mph to 53 mph.

1. Raise vehicle on hoist, remove shift linkage and kickdown linkage, drain transmission fluid, and remove transmission pan.

2. Lower valve body just enough to remove torque converter lock-up spring, replace with supplied spring, PN 4202672. Re-use the existing lock-up valve, fail safe valve and spring, cover, and screws (Figure 1).

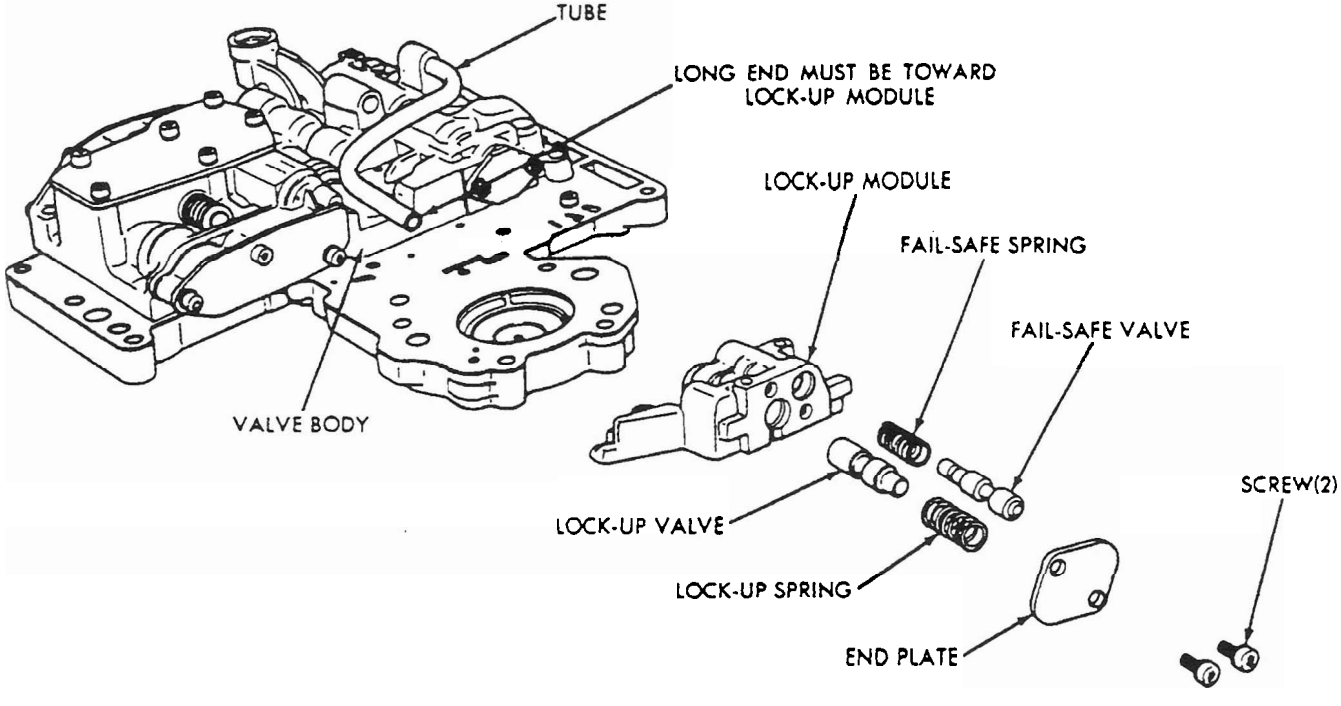



FIGURE 1

3. Reinstall valve body and torque screws to 100 inch pounds.

4. Reinstall transmission oil pan using supplied gasket, PN 4295875. Reconnect shift and kickdown linkage. Lower vehicle and refill using transmission fluid, PN 4318077. Adjust shift and kickdown linkages per the service manual procedures.

5. Remove ESA and replace with supplied ESA, PN 4379255.

6. Type Authorized Modification Label, PN 4275086, as shown in Figure 2 and attach near VECI label.

# SHUDDER

SYMPTOM/CONDITION

Part throttle surge warm at 30-40 mph following transmission lock-up.

DIAGNOSIS

Road test the vehicle and verify the condition. If surge is still present at steady speeds between 30 and 40 mph with the engine fully warmed up and after all warm driveability diagnostic procedures have been followed, do the following:

REPAIR PROCEDURE

| | | |
|---|---|---|
| Parts Required: | 1 - Spring | PN 4202672 |
| | 1 - Lock-Up Body* | PN 4202209 |

*Refer to Step 2 of "Repair Procedure" for usage of this part.

1. Remove transmission oil pan.

2. Remove valve body and inspect the lock-up valve body.

   A. If lock-up valve body is the old style lock-up body (Figure 1), replace it with new style Lock-Up Body (Figure 2) PN 4202209 and replace the present lock-up spring with a new Lock-Up Spring PN 4202672. Re-use the existing lock-up valve, fail safe valve and spring, cover, and screws.

   B. If the lock-up valve body is the new style lock-up body (Figure 2), install only the new Lock-Up Spring PN 4202672.

3. Install the valve body and torque screws to 35 inch pounds (4 Nm).

4. Install the transmission oil pan and fill with ATF fluid.
5. Adjust shift and throttle linkage as necessary.

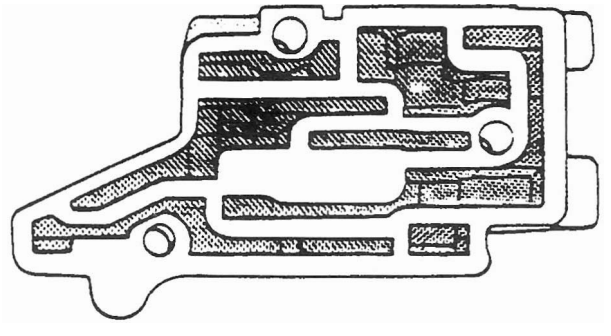


FIGURE 1

OLD STYLE

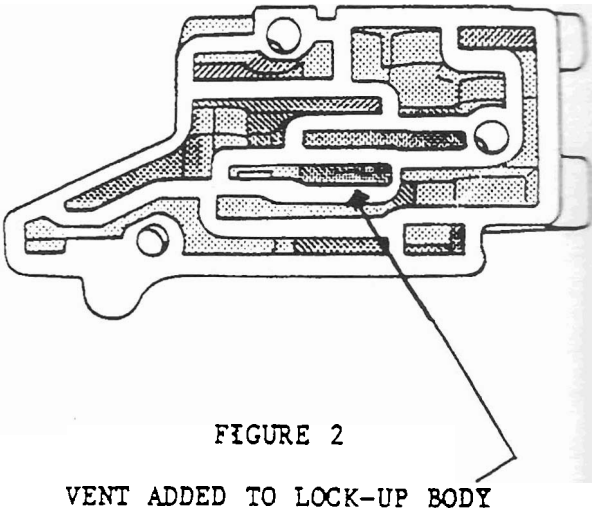


FIGURE 2

VENT ADDED TO LOCK-UP BODY

NEW STYLE

# 1 A TORQUE CONVERTER IS BASICALLY TWO FANS

The two-fan example of a "fluid coupling" is technically just the same as a torque converter. If you use a denser fluid, oil instead of air, you get a firmer, more powerful drive with less slippage, but the principle is the same. Keeping this principle in mind will help you understand the automotive torque converter and why the lock-up feature is desirable.

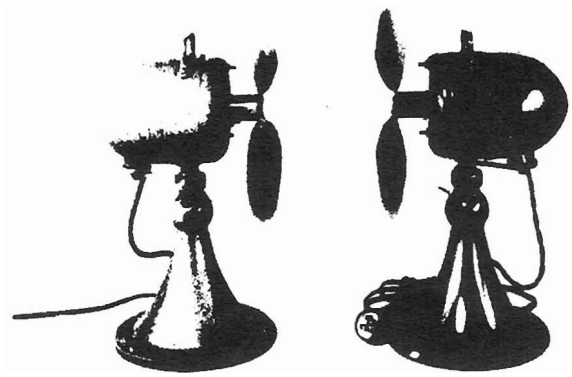


Fig. 1 — A torque converter is similar to two fans, one powering the other.

**IMPELLER ALWAYS DRIVES THE TURBINE**

In a conventional torque converter (Fig. 2), the driving fan, welded to the converter shell, is always turning at the same speed as the engine.

And although that "neck" sticking out on the right looks like it's driving the transmission, it's not. It just drives the front oil pump in the transmission, nothing else. The actual output of the converter and input to the transmission is a splined shaft inside the "neck."

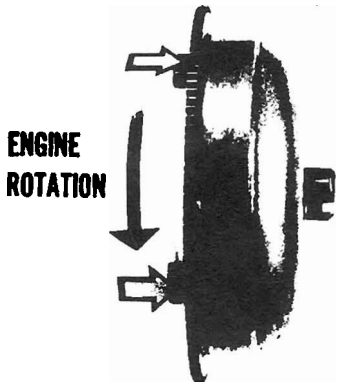



Fig. 2 — Torque converter shell is bolted directly to the engine, turns at engine speed.

**CONVENTIONAL TORQUE CONVERTER IS A TRUE FLUID COUPLING**

In a conventional converter (Fig. 3), notice that the impeller, "Fan #1," drives the turbine, "Fan #2," by means of an oil coupling only. There's no direct mechanical link at all between the engine and the transmission.

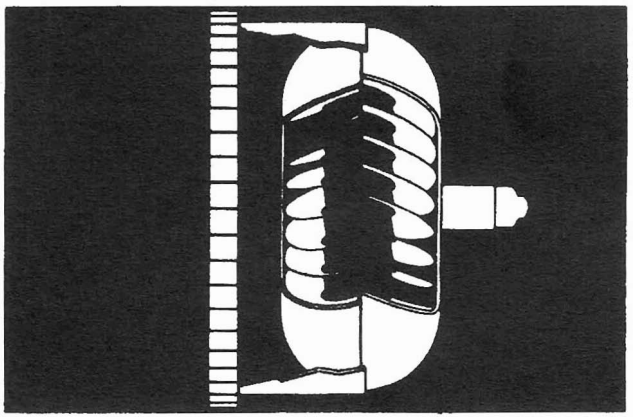


Fig. 3 — Conventional converter has oil coupling only — there's no direct mechanical link.

**OIL CAN CAUSE A DRAG**
A simple fluid coupling, however, can suffer certain power losses if the driving oil flows back and impedes the driving "fan." This problem is overcome by adding a third element to the system — the stator.

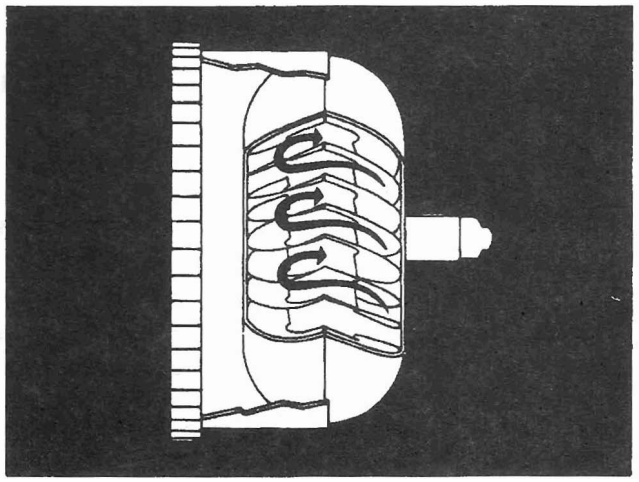


Fig. 4 — In a simple fluid coupling, the "driving" oil can flow back and interfere with the driving "fan."

# 2 STATOR PROVIDES TORQUE MULTIPLICATION

As its name suggests, the stator works while it's standing still. Although the stator is free to rotate forward when the oil flow hits the back sides of the stator vanes (direct drive), during acceleration the oil flow is on the front sides of the stator vanes. This oil pressure tries to turn the stator backward, but a one-way clutch prevents backward rotation of the stator.

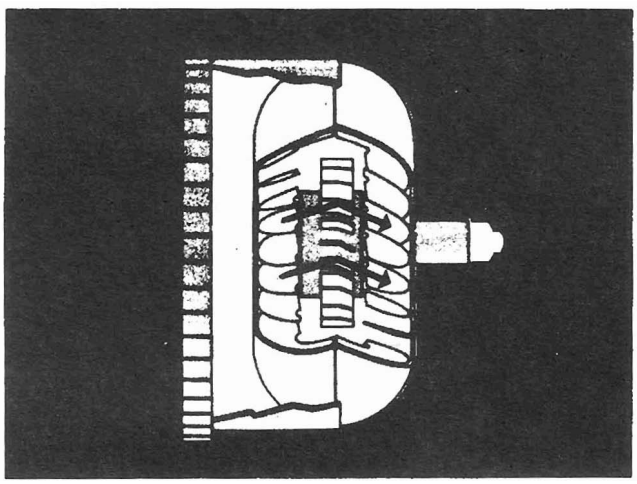


Fig. 5 — In a torque converter, the stator re-directs the driving oil in a helping direction back into the impeller.

**OIL FLOW DURING ACCELERATION**
When the engine speeds up for acceleration in low gear, the impeller, of course, speeds up the same as the engine. In the torque converter, the oil is forced violently into and out of the turbine and against the front of the stator vanes. This forces the stator into lock, and the stator vanes now re-direct the oil flow in a helping direction back into the impeller.

The impeller, in turn, uses the re-directed oil to push the turbine and the cycle is repeated.

**TORQUE MULTIPLICATION**
With the addition of the stator, the total push finally given to the impeller is greatly increased.

When the turbine is turning slowly and the impeller is turning fast, the torque at the reaction shaft may be several times the torque input from the engine.

You can remember it this way: When there is a great difference between impeller speed and turbine speed, the oil flow locks the stator and torque multiplication occurs.

On the other hand, when the impeller and turbine speeds are closer together, the oil flow tends to pull the stator in the forward direction. The stator's overrunning clutch now permits forward rotation of the stator — in effect, letting the stator "coast along" with the oil flow.

**FLUID COUPLINGS ALL SLIP A LITTLE**
Although fluid couplings provide smooth, shock-free power and torque transfer, it is natural for all fluid drives to slip somewhat, even in direct drive.

In the past, a small amount of slippage in direct drive was tolerated, because the potential savings in fuel did not justify the added expense of a lock-up feature. Present conditions, however, have changed that understanding.

# 3 CHRYSLER'S LOCK-UP TORQUE CONVERTER

With a conventional converter in direct drive, both the impeller and the turbine are rotating at approximately the same speed. The stator is freewheeling, and no torque multiplication is produced or needed. However, as we have noted, the fluid coupling part of the torque converter still allows a slight amount of slippage between its members.

If we can now lock the turbine and the impeller together, we can achieve a condition of zero slippage in direct drive.

**NEW PISTON LOCKS TURBINE TO IMPELLER**
Chrysler engineers added a moveable piston to the turbine, and opposite the piston they added friction material to the inside of the impeller housing.

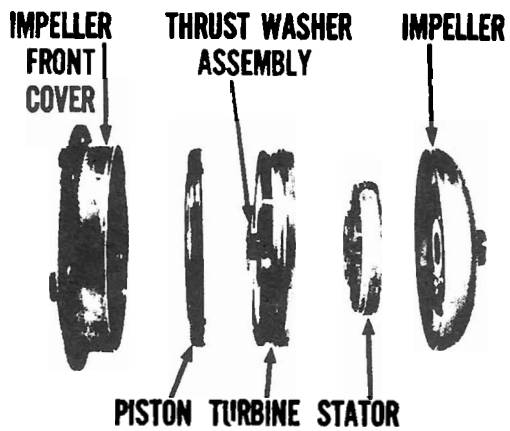



Fig. 6 — New lock-up converter has clutch to lock turbine to impeller in direct drive.

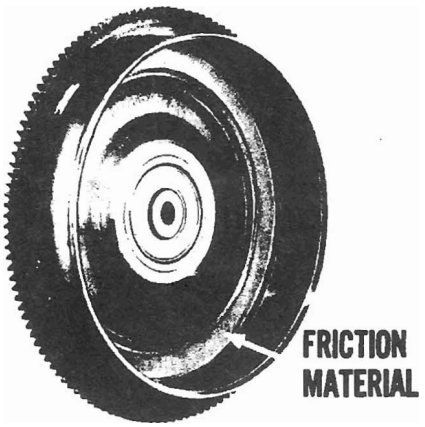



Fig. 7 — Lock-up friction material is bonded inside impeller front cover.

Now, by means of oil pressure, the turbine piston can be forced against the impeller friction material resulting in total converter lock-up. This is done in direct drive only.

The result is a straight-through 1:1 mechanical connection of the engine and transmission plus the elimination of all hydraulic fluid slippage in direct drive.

**TORSIONAL VIBRATION DAMPERS ADDED**
Since the locked-up mode has eliminated the vibration damping effect of the conventional fluid coupling, any torsional vibration load transmitted by the engine is now absorbed by ten damper springs between the lock-up piston and the turbine.

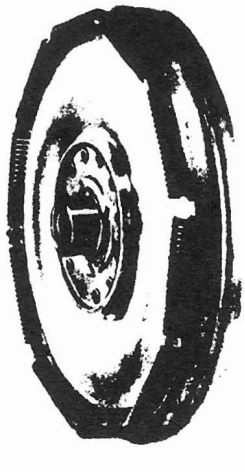


Fig. 8 — Ten damper springs absorb any torsional vibration load from the engine.

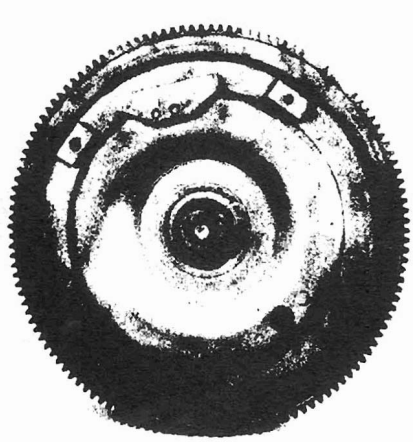


Fig. 9 — Lock-up converter has color-coded identification decal near offset lug.

**THREE DIFFERENT SPRING RATES**
You can't see them, but the springs are color coded red, white, or blue. Each engine application with a lock-up torque converter has its own specification on damper springs. Therefore only the identical lock-up converter may be used for replacement.

**COLOR-CODED IDENTIFICATION**
Lock-up torque converters are identified by a decal, applied at the factory, and visible near the offset lug on the converter. The decal identifies the converter as lock-up, and indicates whether stall speed is HIGH ("HS") or LOW ("LS"). Also, the color of the decal matches the damper spring color and indicates the engine application.

RED: 360 and 400 C.I.D. engine
WHITE: 318 C.I.D. engine
BLUE: 225 C.I.D. engine

Decals with other colors (Green and Orange) indicate non-lock-up torque converters.

# 4 WHEN LOCK-UP OCCURS

The lock-up mode is activated only in direct drive. Even though there is some hydraulic slippage in all gears, the lock-up feature cannot be applied in low and second gears because lock-up eliminates the torque multiplication necessary for acceleration. This means lock-up only occurs after the 2-3 upshift.

In order to prevent engine lugging due to lock-up at too low an engine speed, the minimum lock-up and disengagement points are approximately 24 to 34 mph depending on engine size and axle ratio. This means that the minimum 2-3 shift (light throttle) will occur earlier than the minimum lock-up shift.

At heavier throttle, where the 2-3 shift occurs above the minimum lock-up speed, the lock-up shift will occur immediately after the 2-3 shift.

# 5 LOCK-UP CONTROL

Lock-up and unlock are completely automatic and are controlled by new circuits in the transmission valve body.

The spool valve you knew in the past as the "torque converter control valve" has been modified for the lock-up system and is now called the "switch valve."

The switch valve provides both the "on" and "off" oil pressures which move the lock-up piston.

**SWITCH VALVE CONTROLLED BY NEW LOCK-UP MODULE**

The switch valve will not operate (to activate the lock-up piston) until two other control valves are switched. These two valves are housed in a new lock-up control valve body.

The LOCK-UP VALVE reacts to prop shaft speed and automatically directs the switch valve to lock up if the vehicle is above a certain speed.

The FAIL-SAFE VALVE will permit lock-up in direct gear only when the transmission front clutch has sufficient pressure.

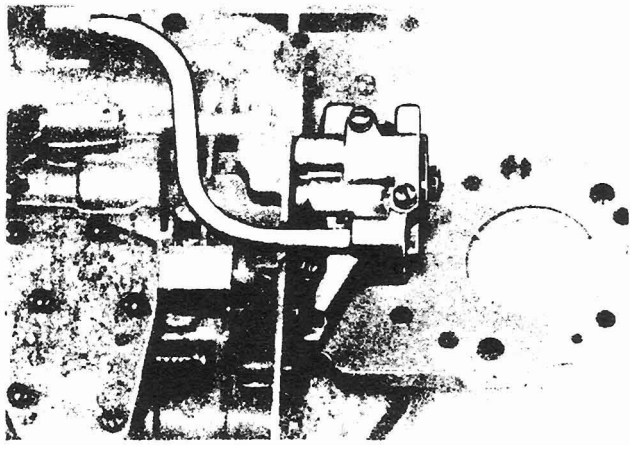


Fig. 10 — New lock-up module on valve body holds lock-up valve, fail-safe valve.

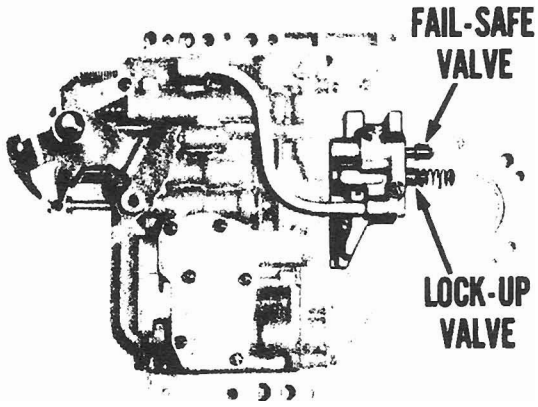



Fig. 11 — Both these valves must switch before "switch" valve will operate.

The fail-safe valve also provides fast lock-up release during a kickdown.

The smooth sensing actions of both the lock-up valve and the fail-safe valve are necessary for good shift quality.

**NEW OIL PASSAGES**

In order to provide the oil pressures needed to move the lock-up piston, there's a new oil passage through the transmission input shaft.

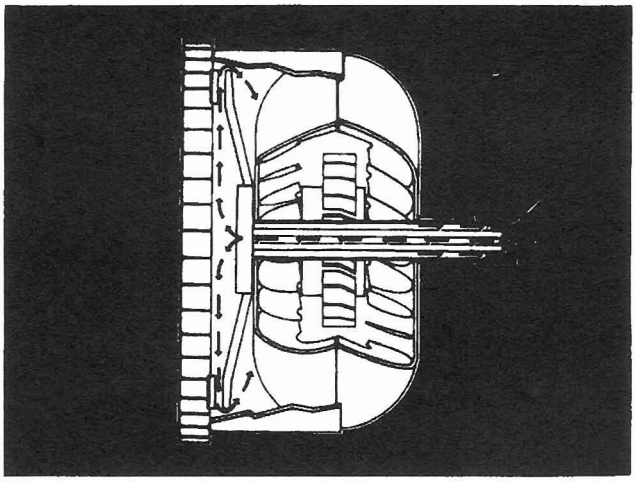


Fig. 12 — New oil passage through input shaft provides hydraulic control of lock-up piston.

In the unlocked mode, transmission converter pressure is applied through the shaft. The oil flows around the unlocked piston face, back through the converter and out between the reaction shaft and the input shaft.

When the conditions are right for lock-up, the switch valve vents the pressure on the front side of the piston. This causes the line pressure behind the piston to force it into lock.

The lock-up friction material and an O-ring at the I.D. of the piston provide a pressure seal across the piston face to keep the converter in the locked-up mode. There is an additional lip seal located in the I.D. of the turbine hub to prevent internal leakage.

## 6 TESTING FOR LOCK-UP OPERATION

To test for lock-up operation, it's necessary to take the car on the road. A road test will tell you if the lock-up clutch is actually locking up and whether it is holding or slipping.

Fig. 13 — A road test is required to check for proper lock-up operation.

**USE A TACHOMETER**
Hook up an accurate engine tachometer and watch the engine speed in direct drive.

Watch the tachometer as you press the accelerator to detent position just short of kickdown above 50 miles per hour. The tachometer should indicate little or no increase in RPM if the lock-up clutch is holding properly.

**SLIGHT SLIPPAGE IS OK**
Some lock-up torque converters may show a slight momentary increase in RPM during acceleration in direct gear.

**If the momentary increase is not more than 250 RPM, the converter may be considered normal.**

## 7 LOCK-UP CONVERTER SERVICING

You can test the lock-up converter for proper stator clutch operation and the holding ability of the transmission clutches just as you would with any other converter — by using the familiar "stall" test. This test tells if the stator is holding and providing the torque multiplication necessary for good acceleration.

**WHAT THE STALL TEST DOES**
The stall test applies full engine power against an unmoving, or "stalled," turbine, stator, and transmission. The stall test is done only in direct drive.

Since the impeller is putting full engine power

into the converter and it can't get out because of the stalled turbine, the transmission oil is very quickly heated to the danger point.

**For that reason, do not exceed wide-open throttle for longer than necessary to get the maximum RPM reading, and never longer than five seconds at a time.**

During the stall test, maximum engine speed is limited by the restriction of the oil flow as it is forced through the (locked) stator. That determines the engine speed you're looking for in the chart in the Service Manual. Either faster or slower engine speeds than those shown in the chart indicate torque converter or other transmission problems.

If the stall speed is above the specification it indicates that something is not "holding the engine back" as it should, and only transmission clutch slippage can be the cause. You'll have to make transmission oil pressure and air pressure checks as shown in the Service Manual to determine the cause of the slippage.

Assuming that the engine is properly tuned before running the test, a slower-than-specified stall figure indicates a stator clutch problem. You'll have to make a road test to determine the cause.

If the stall speeds are 350 to 500 RPM below specification, and the vehicle operates properly at highway speeds, but acceleration through the gears is poor, the stator overrunning clutch is slipping.

The torque converter should be replaced if this fault is confirmed.

## TORQUEFLITE TRANSMISSION STALL SPEED CHART

| Engine Cu. In. | Transmission Type | Converter Diameter | Stall R.P.M. |
|---|---|---|---|
| 225 | A-904 | 10-3/4" | 1800-2100 |
| 318 CAL./Hi. Alt. | A-904-LA | 10-3/4" | 2125-2425 |
| 318 FED. | A-904-LA | 10-3/4" | 1700-2000 |
| 225 | A-904-HD | 10-3/4" | 1800-2100 |
| 318 CAL./Hi. Alt. | A-727 | 10-3/4" | 2125-2425 |
| 318 FED. | A-727 | 10-3/4" | 1700-2000 |
| 360-4 H.D. | A-727 | 10-3/4" | 2150-2450 |
| 360-2 | A-904-LA | 10-3/4" | 1775-2075 |
| 360-2 | A-727 | 10-3/4" | 1775-2075 |
| 360-4 CAL./Hi. Alt. | A-904-LA | 10-3/4" | 2150-2450 |
| 400-4 | A-727 | 10-3/4" | 1850-2150 |
| 400-4 H.D. | A-727 | 10-3/4" | 2300-2600 |
| 440-4 | A-727 | 10-3/4" | 1950-2250 |
| 440-4 H.P. | A-727 | 10-3/4" | 2500-2800 |

During the stall test, a whining or siren-like noise caused by fluid flow is normal with some torque converters.

However, if you hear definite metallic noises, such as would be caused by loose parts or interference inside the torque converter, you may have a defective unit. To confirm that the noise does originate within the converter, operate the vehicle at light throttle on a hoist with the transmission in DRIVE or NEUTRAL. Then listen for the noise under the transmission bell housing.

The stall test can be hazardous to perform since the engine is in DRIVE and throttle is wide open. Be certain to follow the exact procedure and precautions given in your Service Manual whenever performing stall tests.

Overheating the transmission fluid and damaging the converter or transmission can also result if the test is not conducted properly. Again, follow the Service Manual directions exactly.

# 8 THAT'S THE SERVICE STORY ON TORQUE CONVERTERS

The lock-up torque converter allows no other service operations. While in the past you may have flushed a converter or replaced a ring gear, these procedures are no longer recommended. In fact, you'll not find a drain plug on any Chrysler torque converter, lock-up or conventional.

**NO NEW RING GEAR OR BALANCE WEIGHT REPLACEMENTS**

In the past, it was acceptable for a ring gear to be replaced on a torque converter by grinding away the welds, breaking off the gear, and re-welding a new gear in place. This is not recommended for the lock-up converter. The same restriction applies to the converter balance weights on the front cover. In the photo (Fig. 14) you can see the normal "heat scars" from the original ring gear welds at the factory. You can also see the bonded friction material close by which was installed after the welding operation. If you attempted to re-weld a new ring gear or balance weights, the rewelding operation could easily overheat the friction material causing it to fail.

Therefore, in the event of a ring-gear failure the entire lock-up converter should be replaced.

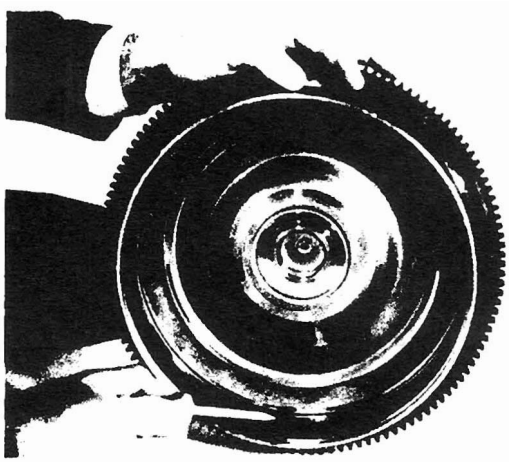


Fig. 14 — Welding "heat scars" show why ring gear replacement is not recommended.

**NO EXCHANGE APPLICATIONS**

Even though the overall dimensions are about the same, there is no way to use the new lock-up torque converter or the new lock-up valve body with any other transmission.

**LOCK-UP COMPONENTS NOT THE SAME FOR ALL ENGINES**

You'll also see that lock-up components specified for one engine may not be suitable for another car/engine application even if it, too, is a lock-up.

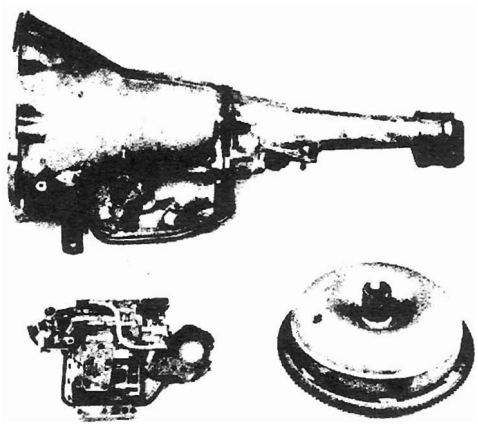


Fig. 15 — Lock-up and non-lock-up components are not interchangeable.

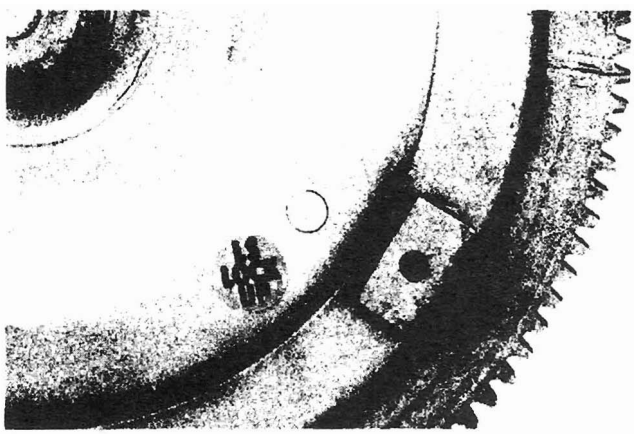


Fig. 16 — Decal shows converter engine application and indicates high stall or low stall stator.

At this writing there are 12 different lock-up converters. All of these converters can be identified by a decal mounted just inboard of the 2° offset drive lug on the converter shell.

The decal is visible by removing the transmission dust shield and rotating the converter to the correct hole in the drive plate. Color-coded decals indicate whether the converter has a high stall (HS) stator or low stall (LS) stator. Therefore, follow the background color and stall code of the decal to match the converter to the correct engine:

**RED. 360 and 400 C.I.D engine**
**BLUE. 225 C.I.D. engine**
**WHITE. 318 C.I.D. engine**

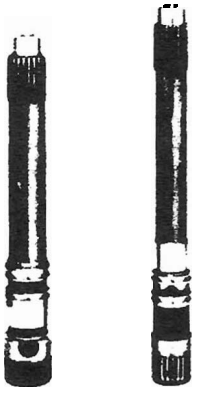


Fig. 17 — Lock-up converters require lock-up transmission input shafts.

Input shafts to the transmission are also different for the lock-up converter. Conventional shafts can not be used for any non-lock-up application.

**NEW OWNERS ADVISED ABOUT LOCK-UP**

Owners of new cars equipped with the lock-up torque converter will be provided information in the Operator's Manual Literature Package advising them that they might feel the lock-up engagement when it occurs.

Although most drivers will not be aware of the lock-up action, some owners may notice it and may require additional assurance that the transmission is operating properly.

# You'll find a change in reverse line pressure!

All automatic transmissions in 1978 are equipped with modulated reverse line pressure that provides controlled pressure in reverse gear. Previously, reverse line pressure was a constant 260 psi (1793 kPa) throughout the full range of throttle operation. This pressure is now modulated from 150 psi (1034 kPa) at idle speeds to 260 psi at full throttle operation. This change reduces the pressure to which the front clutch seals and reaction shaft seals are subjected, providing a beneficial effect on transmission durability and reliability. This improvement is accomplished by routing the reverse control fluid to the regulator valve, reducing the fluid pressure at closed throttle to 150 psi. At wide-open throttle, the regulator valve provides the 260 psi needed during heavy-duty reverse operation such as backing up grades or parking a heavy trailer. However, during normal reverse operation such as backing out of a parking space or a driveway, the system is only subjected to a pressure of about 160 psi (1103 kPa).

## ELEMENTS IN USE AT EACH POSITION OF THE SELECTOR LEVER

| Lever Position | Gear Ratio | Start Safety | Parking Sprag | Clutches Front | Clutches Rear | Clutches Over-running | Lock-up | Bands (Kickdown) Front | Bands (Low-Rev.) Rear |
|---|---|---|---|---|---|---|---|---|---|
| P—PARK | | X | X | | | | | | |
| R—REVERSE | 2.21 | | | X | | | | | X |
| N—NEUTRAL | | X | | | | | | | |
| D—DRIVE | | | | | | | | | |
| First | 2.45 | | | | X | X | | | |
| Second | 1.45 | | | | X | | | X | |
| Direct | 1.00 | | | X | X | | X | | |
| 2—SECOND | | | | | | | | | |
| First | 2.45 | | | | X | X | | | |
| Second | 1.45 | | | | X | | | X | |
| 1—LOW (First) | 2.45 | | | | X | | | | X |

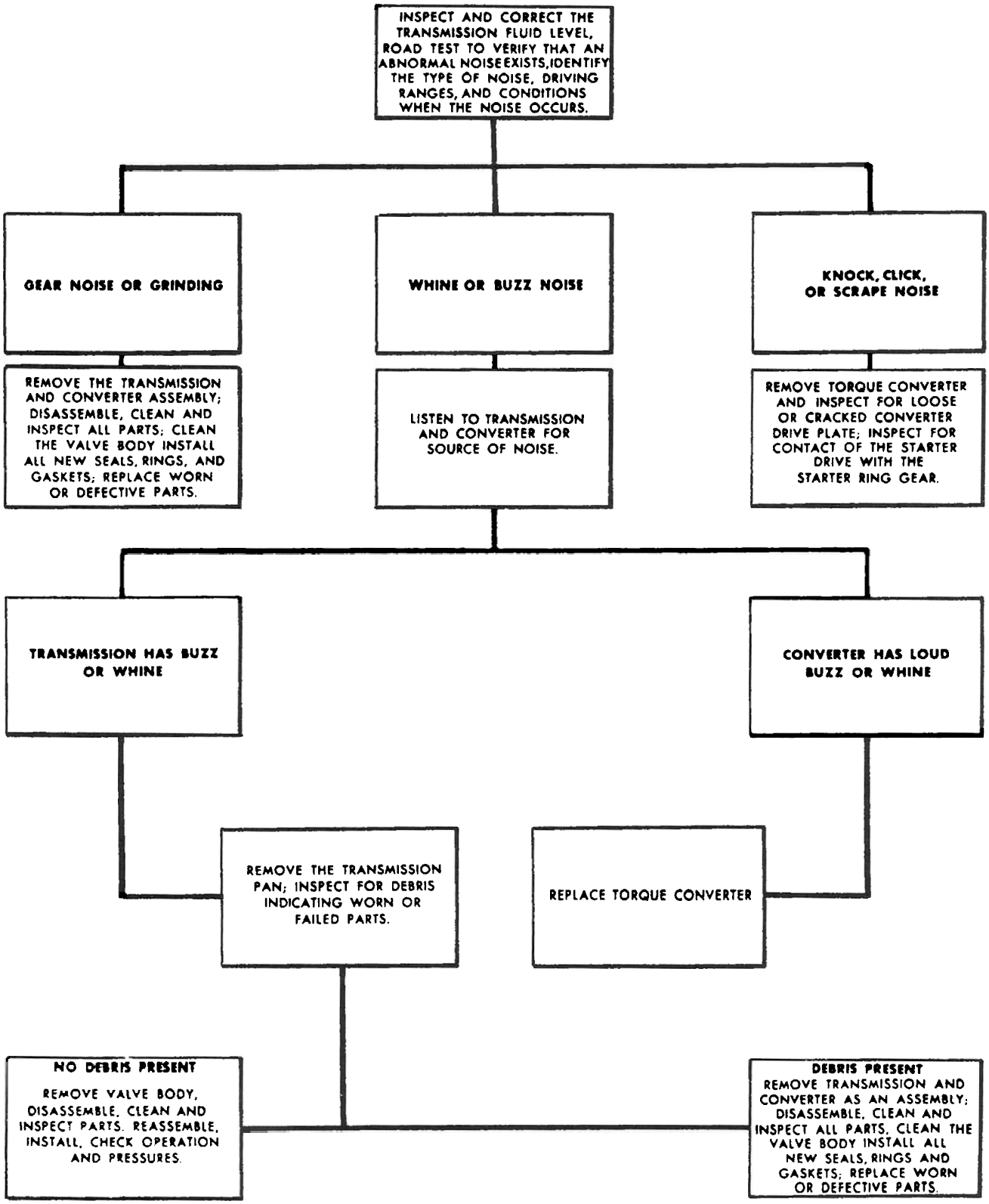
## AUTOMATIC SHIFT SPEEDS AND GOVERNOR PRESSURE CHART (APPROXIMATE MILES PER HOUR)

| Carline | HNFG | HNFG | RW | SX | C | C |
|---|---|---|---|---|---|---|
| Engine Cu. In. | 225 | 318 | 360-4 Hi. Perf. | 360-2 | 400-2 400-4 | 400-4 &440 Hi. Perf. |
| Axle Ratio | 2.76 | 2.45 | 3.21 | 2.45 | 2.71 | 2.71 |
| Tire Size | 6.95x14 | E78x14 | H78x14 | GR78x15 | HR78x15 | JR78x15 |
| Throttle Minimum | | | | | | |
| 1-2 Upshift | 9-16 | 8-16 | 8-15 | 9-16 | 9-16 | 8-15 |
| 2-3 Upshift | 15-25 | 15-25 | 15-23 | 17-25 | 15-25 | 15-23 |
| 3-1 Downshift | 8-13 | 9-14 | 8-13 | 9-14 | 8-13 | 8-13 |
| Throttle Wide Open | | | | | | |
| 1-2 Upshift | 31-43 | 39-54 | 43-56 | 41-57 | 37-52 | 38-53 |
| 2-3 Upshift | 63-76 | 79-95 | 78-93 | 83-100 | 77-92 | 77-93 |
| Kickdown Limit | | | | | | |
| 3-2 WOT Downshift | 60-73 | 76-92 | 75-90 | 79-96 | 73-89 | 74-90 |
| 3-2 Part Throttle Downshift | 46-61 | 30-56 | 34-57 | 31-58 | 30-56 | 29-54 |
| 3-1 WOT Downshift | 28-35 | 30-44 | 34-47 | 31-46 | 29-43 | 29-43 |
| Lock-up Limit | | | | | | |
| Minimum in Direct | 27-37 | 24-29 | 26-30 | 26-30 | 23-26 | (None) |
| Governor Pressure* | | | | | | |
| 15 psi | 20-22 | 21-23 | 20-22 | 22-24 | 21-23 | 21-23 |
| 40 psi | 47-53 | 60-66 | 60-66 | 62-69 | 59-66 | 58-65 |
| 60 psi | 66-72 | 83-90 | 81-88 | 87-94 | 82-90 | 81-88 |

*Governor pressure should be from zero to 1.5 psi at stand still or downshift may not occur.

NOTE: Figures given are typical for other models. Changes in tire size or axle ratio will cause shift points to occur at corresponding higher or lower vehicle speeds.

## DIAGNOSIS GUIDE-ABNORMAL NOISE


INSPECT AND CORRECT THE TRANSMISSION FLUID LEVEL, ROAD TEST TO VERIFY THAT AN ABNORMAL NOISE EXISTS, IDENTIFY THE TYPE OF NOISE, DRIVING RANGES, AND CONDITIONS WHEN THE NOISE OCCURS.
GEAR NOISE OR GRINDING
WHINE OR BUZZ NOISE
KNOCK, CLICK, OR SCRAPE NOISE
REMOVE THE TRANSMISSION AND CONVERTER ASSEMBLY; DISASSEMBLE, CLEAN AND INSPECT ALL PARTS; CLEAN THE VALVE BODY INSTALL ALL NEW SEALS, RINGS, AND GASKETS; REPLACE WORN OR DEFECTIVE PARTS.
LISTEN TO TRANSMISSION AND CONVERTER FOR SOURCE OF NOISE.
REMOVE TORQUE CONVERTER AND INSPECT FOR LOOSE OR CRACKED CONVERTER DRIVE PLATE; INSPECT FOR CONTACT OF THE STARTER DRIVE WITH THE STARTER RING GEAR.
TRANSMISSION HAS BUZZ OR WHINE
CONVERTER HAS LOUD BUZZ OR WHINE
REMOVE THE TRANSMISSION PAN; INSPECT FOR DEBRIS INDICATING WORN OR FAILED PARTS.
REPLACE TORQUE CONVERTER
NO DEBRIS PRESENT
REMOVE VALVE BODY, DISASSEMBLE, CLEAN AND INSPECT PARTS. REASSEMBLE, INSTALL, CHECK OPERATION AND PRESSURES.
DEBRIS PRESENT
REMOVE TRANSMISSION AND CONVERTER AS AN ASSEMBLY; DISASSEMBLE, CLEAN AND INSPECT ALL PARTS. CLEAN THE VALVE BODY INSTALL ALL NEW SEALS, RINGS AND GASKETS; REPLACE WORN OR DEFECTIVE PARTS.

## DIAGNOSIS GUIDE-FLUID LEAKS

VISUALLY INSPECT FOR SOURCE OF LEAK. IF THE SOURCE OF LEAK CANNOT BE READILY DETERMINED, CLEAN THE EXTERIOR OF THE TRANSMISSION. CHECK TRANSMISSION FLUID LEVEL. CORRECT IF NECESSARY.

THE FOLLOWING LEAKS MAY BE CORRECTED WITHOUT REMOVING THE TRANSMISSION:

- MANUAL LEVER SHAFT OIL SEAL
- FILLER TUBE 'O' RING
- PRESSURE GAUGE PLUG
- NEUTRAL START SWITCH
- PAN GASKET
- OIL COOLER FITTINGS
- EXTENSION HOUSING TO CASE GASKET
- EXTENSION HOUSING TO CASE BOLTS
- EXTENSION HOUSING YOKE SEAL
- SPEEDOMETER ADAPTER 'O' RING
- FRONT BAND ADJUSTING SCREW

THE FOLLOWING LEAKS REQUIRE REMOVAL OF THE TRANSMISSION AND TORQUE CONVERTER FOR CORRECTION.

TRANSMISSION FLUID LEAKING FROM THE LOWER EDGE OF THE CONVERTER HOUSING: CAUSED BY FRONT PUMP SEAL, PUMP TO CASE SEAL, OR TORQUE CONVERTER WELD.

CRACKED OR POROUS TRANSMISSION CASE.

## DIAGNOSIS GUIDE-VEHICLE WILL NOT MOVE

CHECK THE TRANSMISSION FLUID LEVEL BEFORE STARTING THE ENGINE. IF NO FLUID IS VISIBLE ON THE DIP STICK ADD FLUID TO THE 'L' MARK BEFORE STARTING THE ENGINE. THEN START THE ENGINE WITH THE TRANSMISSION IN NEUTRAL AND LISTEN FOR NOISE.

**NO ABNORMAL NOISE,** MOVE THE SELECTOR TO A FORWARD DRIVE RANGE AND OBSERVE THE PROPELLER SHAFT FOR TURNING.

**ABNORMAL NOISE,** STOP ENGINE IMMEDIATELY. REMOVE THE TRANSMISSION AND CONVERTER AS AN ASSEMBLY. DISASSEMBLE, CLEAN AND INSPECT ALL PARTS. CLEAN VALVE BODY; INSTALL ALL NEW SEALS, RINGS, AND GASKETS. REPLACE WORN OR DEFECTIVE PARTS.

**PROPELLER SHAFT TURNS** BUT REAR WHEELS DO NOT TURN, INSPECT FOR BROKEN REAR AXLE PARTS.

**PROPELLER SHAFT DOES NOT TURN,** REMOVE THE TRANSMISSION OIL PAN. INSPECT FOR DEBRIS.

**NO DEBRIS.** REMOVE VALVE BODY. DISASSEMBLE CLEAN AND INSPECT ALL PARTS. REASSEMBLE. INSTALL AND CHECK PRESSURES AND OPERATION.

**DEBRIS IS PRESENT.** REMOVE TRANSMISSION AND CONVERTER AS AN ASSEMBLY. DISASSEMBLE, CLEAN AND INSPECT ALL PARTS; CLEAN THE VALVE BODY INSTALL ALL NEW SEALS, RINGS, AND GASKETS REPLACE WORN OR DEFECTIVE PARTS.

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